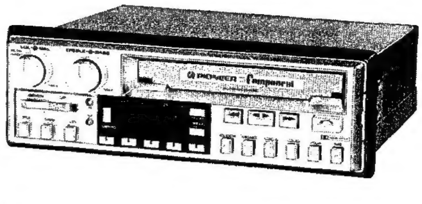
PIONEER

Service Manual



The photo shows the model KEX-73

ORDER NO.
CRT - 254 - 0

CASSETTE CAR STEREO WITH AM/FM ELECTRONIC TUNER

KEX-70 E

CASSETTE CAR STEREO WITH LW/MW/FM ELECTRONIC TUNER

KEX-73 E

SPECIFICATIONS

General

Power source .... DC14.4V (10.8 ~ 15.6V allowable)
Grounding system .... Negative type
Dimensions (chassis) .... 180(W) × 50(H) × 150(D) mm
(Front face) .... 184(W) × 56(H) × 31(D) mm
Weight .... 2.0 kg
Tone controls (bass) .... ±10 dB (100 Hz)
(treble) .... ±10dB (10 kHz)
Loudness contour .... +12 dB (100 Hz), +4 dB (10kHz)
(volume: −30 dB)
Maximum output level .... 200 mV
Output impedance .... 1 kΩ

Tape player

Tape .... Compact cassette tape (C-30 ~ C-90)
Tape speed .... 4.76 cm/sec.
(+0.19 cm/sec. −0.05 cm/sec.)
Fast forward/rewind time .... Within 120 sec. for C-60
Wow & flutter .... No more than 0.09% (WRMS)
Frequency response .... 30 ~ 20,000 Hz (±3 dB) (at metal)
30 ~ 16,000 Hz (±3 dB) (at normal)
Stereo separation .... More than 40 dB
Signal-to-noise ratio .... Dolby NR IN: More than 63 dB
(IEC-A network)
Dolby NR OUT: More than 55 dB
(IEC-A network)

FM tuner

Frequency range .... 87.5 ~ 108 MHz
Usable sensitivity .... 12 dBf (1.1μV/75Ω, mono)
50 dB quieting sensitivity .... 17 dBf (1.9μV/75Ω, mono)
Alternate channel selectivity .... 70 dB (±400 kHz)
Distortion .... 0.3% (at 65 dBf, 1 kHz, stereo)
Frequency response .... 30 ~ 15,000 Hz (±3 dB)
Stereo separation .... 40 dB (at 65 dBf, 1kHz)

AM (MW) tuner

Frequency range .... 531 ~ 1,602 kHz)
Usable sensitivity .... 18μV (25 dB) (S/N: 20 dB) (KEX-70)
Usable sensitivity .... 30μV (29.5 dB) (S/N: 20 dB) (KEX-73)
Selectivity .... 50 dB (±9 kHz)

LW tuner (KEX-73)

Frequency range .... 153 ~ 281 kHz
Usable sensitivity .... 70μV (37 dB) (S/N: 20 dB)
Selectivity .... 50 dB (±9 kHz)

Note:
Specifications and the design are subject to possible modification without notice due to improvements.

- 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories Licensing corporation.
- Noise Reduction System manufactured under license from Dolby Laboratories Licensing Corporation.

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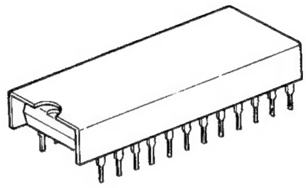
CONTENTS

CAUTION
When Handling IC PD7004 and PD2001
Please Observe:

IC PD7004 and PD2001 (IC6 and IC5 in the tuner control unit—KEX-70, IC5 and IC4 in the tuner control unit—KEX-73) are C-MOS ICs of extremely low power consumption and very high input impedance. Unless handled with special care, they could be damaged by static electricity induction. these ICs are supplied with a shorting cap (of aluminium foil) attached. When soldering or performing other repair work, always attach this cap as shown below. Remove the cap after the repair has been completed.
Also, this type IC must not be inserted in a polystyrene package for storage.



• Cassette Mechanism Unit

See the Service Manual CX-118FV (CRT-199) when servicing the cassette mechanism unit.
The differences from the CX-118FV are shown below.

Exploded View (Top) Page 26

CX-118FV			KEX-70, KEX-73	
Key No.	Part No.	Description	Part No.	Description
24	CPB-049	Head	CPB-063	Head

Exploded View (Bottom) Page 26

CX-118FV			KEX-70, KEX-73	
Key No.	Part No.	Description	Part No.	Description
1	CXM-065	Motor	CXM-072	Motor

1. PARTS LOCATION

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  ★ ★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

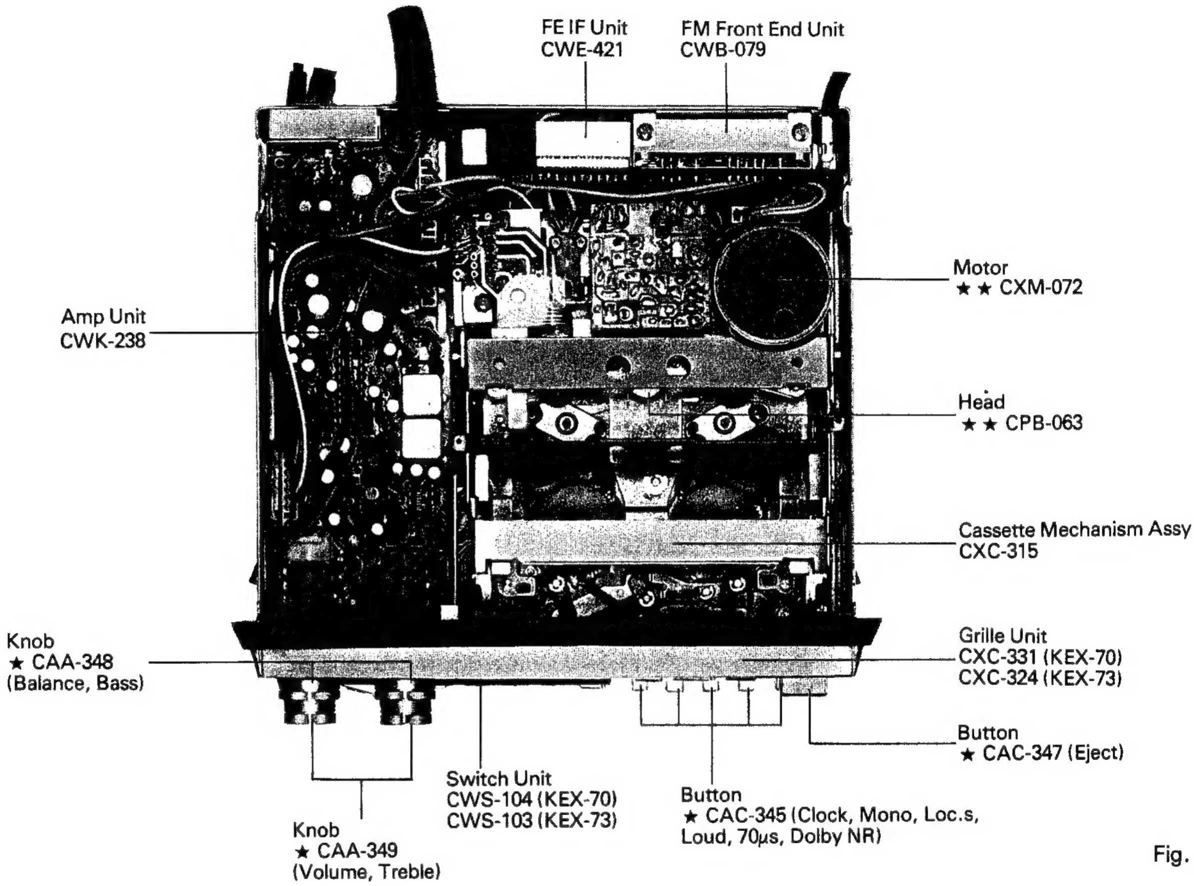


Fig. 1

2. CIRCUIT DESCRIPTION

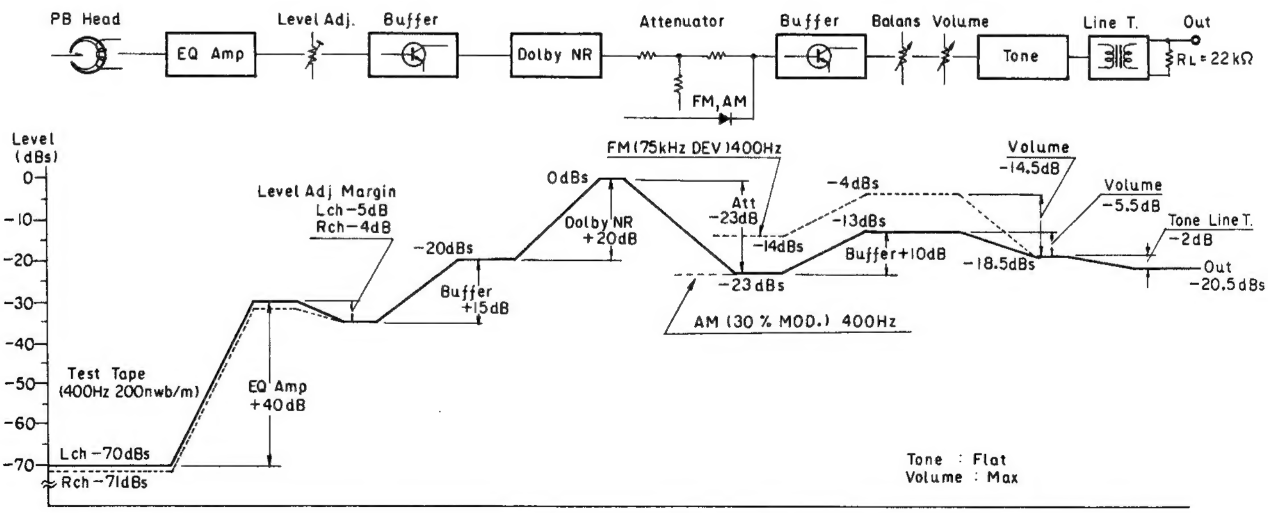


Fig. 2

2.1 TAPE SECTION

• Dolby NR Circuit

The Dolby NR system functions to reduce the amount of tape hiss and expand the dynamic range of the high frequencies. It is able to improve the S/N ratio by 10 dB.
When the Dolby NR switch is at the OFF position, the Dolby NR circuit functions as a flat amplifier, thereby allowing tapes which have not been recorded with the Dolby system to be played back.
The Dolby NR switch is set to ON when playing tapes which have been recorded with the Dolby NR system.

When the switch is at OFF, + B is applied to the base of transistor Q5 which then turns OFF since it is a PNP type. Since the signal components no longer pass through the highpass filter, the circuit functions as an ordinary flat amplifier.
When the Dolby NR switch is at ON, + B is no longer applied to the base of transistor Q5 which then turns ON. + B is applied to the Dolby NR indicator which lights. Since Q5 is ON, the highpass filter is connected to the output and the Dolby noise reduction effect is produced.

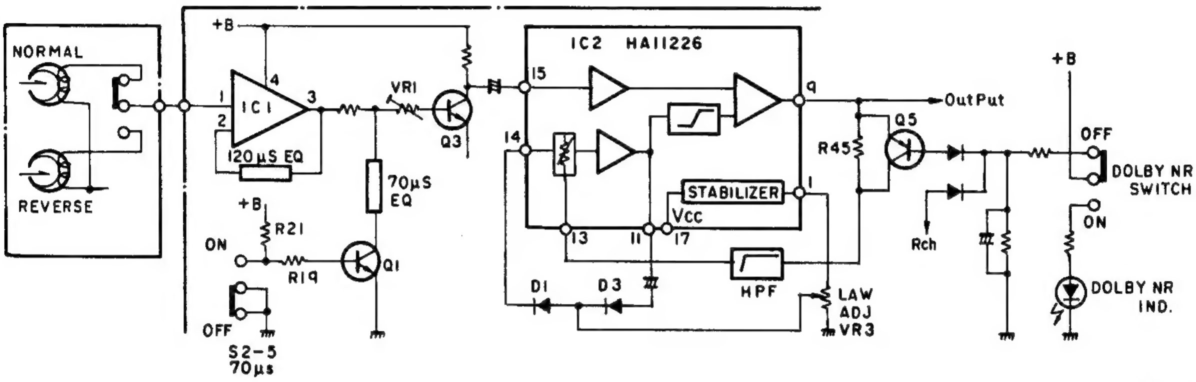


Fig. 3

• Equalizer Amplifier

The MB3106M dual-type IC is employed in the equalizer amplifier.
When the 70μs switch is OFF, Q1 (Lch) and Q2 (Rch) go OFF and the amplifier functions as a normal equalizer (3180μs + 120μs).

When the same switch is ON, Q1 and Q2 turn ON, the 70μs equalization network is added and the amplifier functions as a CrO_2 (Metal) equalizer (3180μs + 70μs), enabling the playback of CrO_2 tapes.

2.2 MUTING CIRCUIT

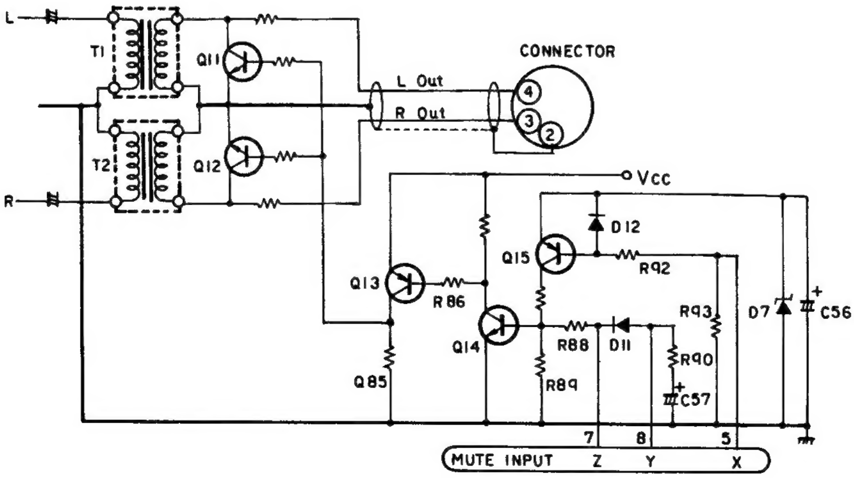


Fig. 4

All the muting operations in the KEX-70 (KEX-73) are carried out by the output section of the amplifier unit. A line transformer is used in this section to achieve a high common-mode rejection ratio (CMRR).
Muting itself is performed by shorting the secondary (output side) of the line transformer with transistors Q11 and Q12.
Muting is operational in the following circumstances:
(a) Fast forward and rewind operations
(b) A.T.S.C. (Automatic Tape Slack Canceller) operation
(c) Scanning and seek operations
(d) When the preset button has been depressed
(e) When the up/down button has been depressed
(f) When the reception band is switched over
(g) When the tuner goes OFF
Operations (a) and (b)
A positive voltage is supplied from PD2001 from mute input pin Y, and Q14 and Q13 are turned on. When Q14 and Q13 are ON, Q11 and Q12 go ON and muting is effective. D11 functions to prevent reverse current from mute input pin Z, and the time constants of the muting operation are determined by R90 and C57.
Operations (c)~(f)
A positive voltage is supplied from PD7004 from mute input pin Z, and Q13 and Q14 are turned ON. When Q14 and Q13 are ON, Q11 and Q12 turn ON and muting is effective.
Operation (g)
When the tuner is switched on (same for any band position), a voltage (approx. 13V) is supplied from mute input pin X, and C56 is charged through R92 and D12. At this point, Q15 remains in the OFF mode and muting is not effective. Once the tuner is switched OFF, the voltage from the mute input pin X is rapidly reduced to 0V. Q15 is turned ON when the charged C56 discharges. Once Q15 goes ON, Q14 and Q13 both go ON, ultimately resulting in Q11 and Q12 being turned ON so that muting is effective.

2.3 DESCRIPTION OF DECK CONTROL IC PD2001

The PD2001 IC makes it possible to perform fast forwarding, rewinding and direction change operation by feather-touch control.
With every operation a muting output signal is fed out to the PD2001 IC before the operation and a pre-muting circuit is inserted.
The KP-707G is included among the models which employ the PD2001 IC and a description of its circuitry is given in Service Manual (CRT-249) to which reference should be made.
Fig. 5 is used for this particular description. When an input is fed into X1 for changing from the play to fast forward mode, a muting output is first fed out and about 33ms later a voltage virtually equivalent to the VDD is fed out to both OF and OR. As a result, the fast forward and rewind solenoids are attracted and the fast forward mode is established. The time during which both solenoids are attracted is about 100ms. At the same time, input X1 is set to the hold state by the latch circuit.
Once the time during which the fast forward and rewind solenoids are attracted has passed, the OF output is set to a high impedance and so the fast forward solenoid is set to the hold state with a voltage of about 2.5V determined by R76, R77, R79 and D14. Furthermore, the OR output is grounded and the rewind solenoid is released since no voltage is applied to it.
When an input is fed into X3 next (changing from fast forward to rewind), a voltage virtually equivalent to VDD is fed out to OR and the mode is switched to rewinding. About 100ms later the rewind solenoid is set to the hold state by a voltage determined by R76, R78, R80 and D14, and overheating of the solenoid is prevented.

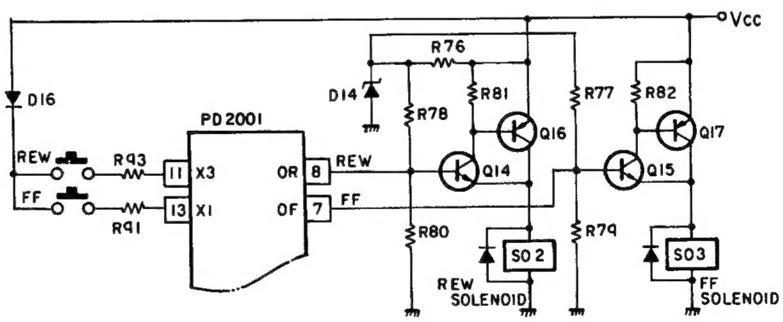


Fig. 5

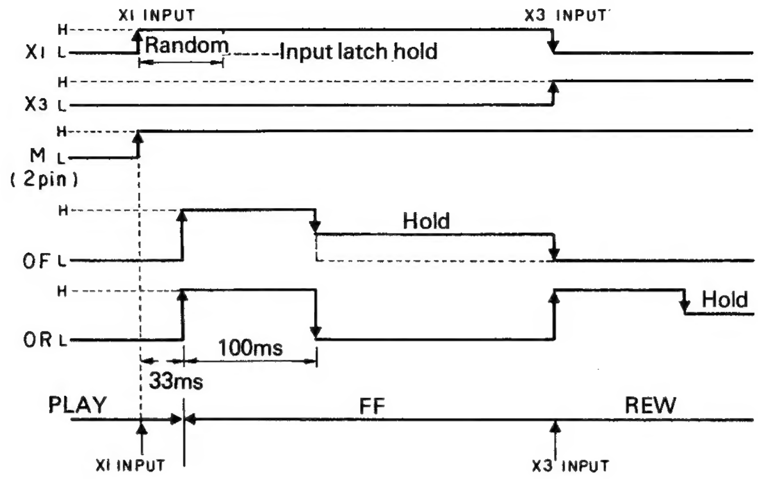


Fig. 6

2.4 FUNCTIONS OF PD7004 CONTROL IC

• PLL Section

The PD7004 is a control IC for PLL synthesizer tuners developed to enable FM reception at 50 kHz steps and AM reception (MW, LW) at 9 kHz steps. When some of the pins of this IC are connected via a diode (switch matrix, mentioned later), a microprocessor is activated in line with the program written beforehand into the IC and scan, seek, memory and other control operations are performed by the 28-pin C-MOS LSI. This is combined with the IR2403 (IC7) driver IC for the display LED to configure the PLL synthesizer tuner.

The PLL synthesizer tuner is now described centering on the circuitry operations of the KEX-70/E (Tuner Control Unit: CWE-070, FE IF Unit: CWE-421).

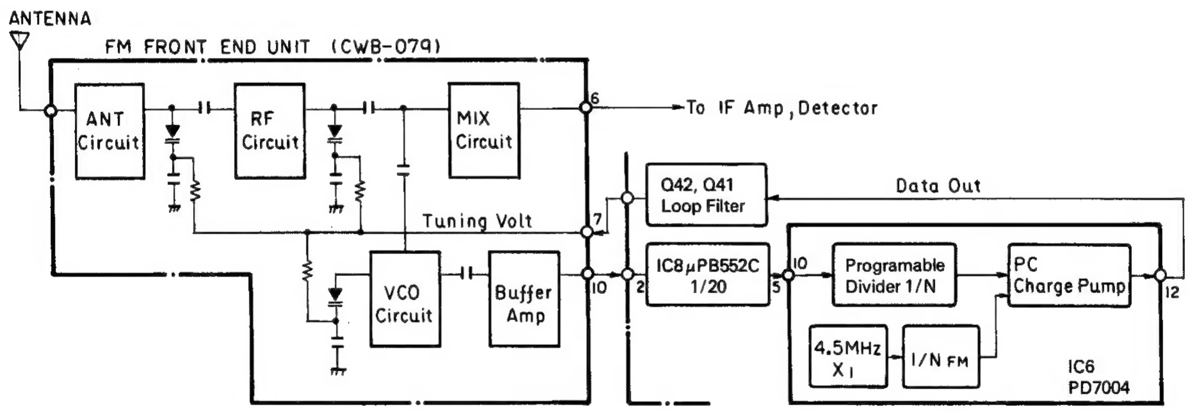


Fig. 7

Fig. 7 shows the composition of the phase-locked loop in the FM mode. The VCO (CWB-079 local oscillator) frequency, fvco, is amplified by Q4 of CWB-079 up to the level the 1/20-fixed divider μPB552C IC8 can divide it, and the prescaler output signal of IC8 entęrs pin 10 of PD7004.

The signal is then fed into the programmable divider which is microprocessor-controlled inside PD7004 and the frequency of the signal is divided by the required ratio. A frequency of 4.5 MHz, whcih serves as the PD7004 clock pulse (fundamental frequency that drives the microprocessor), is generated by crystal oscillator X1, this is divided down (1/1800) to 2.5 kHz to form the reference frequency of the phase comparator whose phase is then digitally compared with that of the frequency-divided signal, and the pulse centering at 2.5 kHz is fed out from pin 12 via the charge pump. The frequency deviation is converted into shifting voltage from a certain DC center voltage. When the frequency is higher than the optimum, positive pulses appear at the output and the more it deviates, the wider pulse-width and vise versa.

This output is then fed into the loop filter (active filter composed of Q41 and 42), the charging and discharging of C93 and C94 are used, a DC voltage is formed and this is applied to pin 6 of CWE-421 as the tuning voltage. The oscillation frequency of the CWB-079's local oscillator is fixed and the

phase-locked loop is then completed. This mode is now locked and the tuning voltage—between approx. 3.0V and 8.8V—is made constant. The ANT, RF and VCO circuits are all controlled, the reception frequency is determined and this is held.

The above can be expressed as follows:

$$(f_{VCO}/20)/N = f_r = 2.5\,\text{kHz}$$
$$f_{VCO} = N \times 20 \times f_r$$
$$= N \times 50\,\text{kHz}$$

This means that every time the programmable divider N counts, the reception frequency changes in a 50 kHz step.
In the AM mode the CWM-070 IC1 local oscillator output is amplified by Q4, it enters pin 11 of PD7002, its frequency is divided down by the programmable divider to f_r = 9 kHz, phase comparison is performed as with FM, a pulse with a frequency of 9 kHz as the reference is fed out from pin 13, a DC voltage is formed by the Q43 and Q44 loop filter, this is supplied to the ANT, RF and OSC block of the AM tuning circuit, the oscillation frequency is fixed and locked. The AM tuning voltage range from 0.9V to 8.8V, with the result that the frequencies vary within a 531 kHz to 1602 kHz range.

The related formula for the AM mode is:

$$f_{VCO} = N \times f_r$$

The f_r serves as the channel spaces (9 kHz) and tuning is performed in 9 kHz steps. This completes the description of the PLL section.

• PD7004 Specifications

	FM	MW	LW
Reception frequency	87.5~108 MHz	531~1602 kHz	153~281 kHz
Channel space	50 kHz	9 kHz	UP/DOWN 1 kHz SCAN, SEEK 9 kHz
IF offset	10.700 MHz	468 kHz	468 kHz
Phase comparison reference frequency	2.5 kHz	9 kHz	1 kHz
Input frequency	4.91~5.935 MHz	999~2070 kHz	621~749 kHz
Prescaler	1/20 externally mounted	None	None
Programmable counter frequency-division ratio N	1964~2374	111~230	621~749
Number of channels	411	120	UP/DOWN 129 SCAN SEEK 15

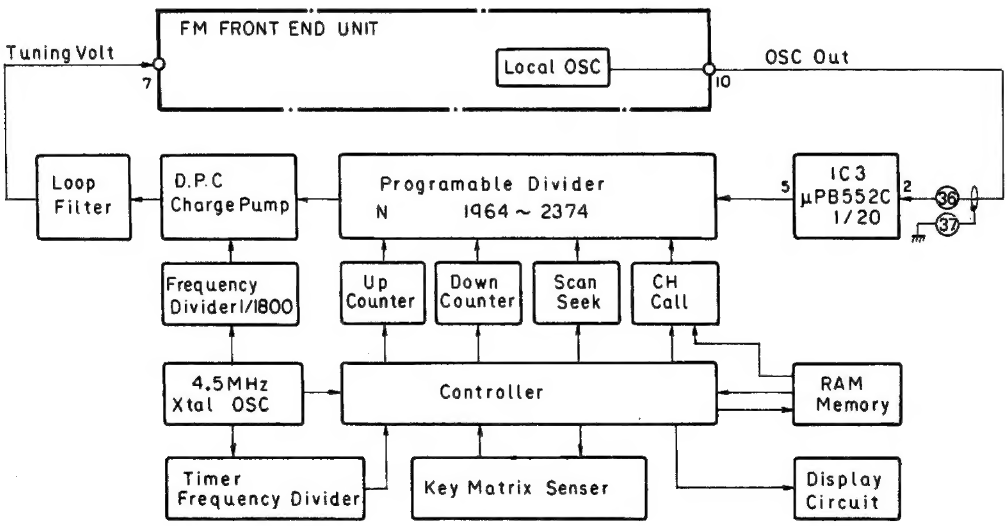


Fig. 8

For instance, when the reception frequency is 87.5 MHz, the local oscillator frequency is 98.2 MHz, a local oscillator voltage of about 200 mVrms (560 mVp-p) is fed out from pin 5 of Front End CWB-079, and this enters prescaler IC8. The minimum acceptable level of this IC is 150 mVp-p and frequency division is not performed at lower levels. The maximum level is 1Vp-p. When the above frequency is divided (1/20), the result is 4.910 MHz and this becomes 2.5 kHz when divided down (1/1964) by the programmable divider (N = 1964). This matches the reference frequency and phase comparison becomes possible. After digital phase comparison, the signal enters the loop filter via the charge pump to become a DC voltage.
When the manual UP key is depressed once, D1/K1 are shorted by the diode and when this is sensed by the K2 pin, the up counter inside the IC counts up, and one is added to the programmable divider N to make 1965, thereby the frequency steps up for one channel on the frequency scale to tune into 87.55 MHz.

In the SCAN mode, the up-counter counts up one by one with the D3/K2 matrix, single units are added in succession to the programmable divider N starting at 1964 and both the reception frequency and the display are changed. When certain frequencies are received, a squelch signal from the tuner enters the control unit, transistor Q32 is turned on, the D6/K2 matrix is energized and the scanning operation is stopped.
In this case, scanning is automatically started with the PD7004 microprocessor after 5 seconds. To stop this operation, the SCAN key is depressed again. When the SEEK key is depressed during the scanning operation, the mode is set to "seek" and, just as with scanning, single units are added in succession to the programmable divider N. Once the squelch signal is sensed, the operation is stopped just as with scanning, and this remains terminated.
MW operations are the same as those for FM but the LW operations are slightly different.
The MW frequency band ranges from 531 kHz to 1602 kHz—a span which can be divided by 9 (multiples of 9). This means that if the reference frequency is made 9 kHz, the same operation as with FM can be induced simply by stepping up or down in single units the programmable divider N.
However, the LW frequency band ranges from 155 kHz to 281 kHz—a span which cannot be divided by 9—thereby making it necessary to make the phase comparison reference frequency 1 kHz.

However, there is currently a movement to make the frequency allotment of LW broadcasting station multiples of 9, and reception frequency band will span 153 kHz to 279 kHz. In order to cope with this change, the PD7004 allows the frequency scale from 153 kHz to 281 kHz to be scanned either up or down in 1 kHz steps during the manual UP/DOWN tuning operation, and it allows a jump to be made at one end of the band to the other end.

Example of UP operation:
279 kHz → 280 kHz → 281 kHz → 153 kHz → 154 kHz
Example of DOWN operation:
155 kHz → 154 kHz → 153 kHz → 281 kHz → 280 kHz
During the SCAN/SEEK tuning operation, the frequency scale is moved up in 9 kHz steps from the starting frequency and when the uppermost frequency limit of 281 kHz is exceeded, the scale is moved up again in 9 kHz steps from the lowermost frequency of 155 kHz.

Example 1 of SCAN/SEEK operation:
263 kHz → 272 kHz → 281 kHz → 155 kHz → 164 kHz

Example 2 of SCAN/SEEK operation:
295 kHz → 268 kHz → 277 kHz → 155 kHz → 164 kHz
The maximum frequency switchable by a C-MOS IC is about 7.2 MHz. This means that the FM local oscillator signal frequency cannot be divided directly and that a prescaler is required to divide the frequency down to about 5 MHz previously.

• Charge Pump and Loop Filter

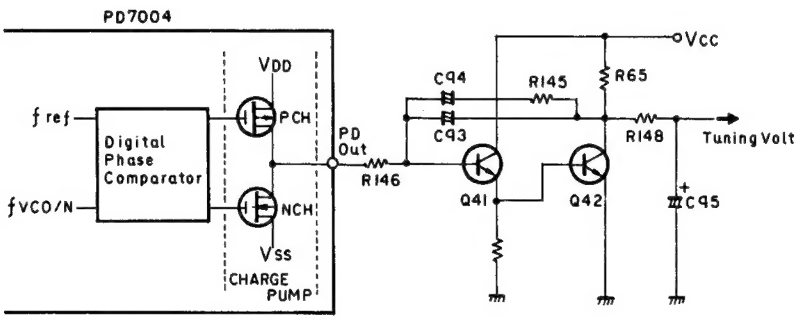


Fig. 9

The phases of the reference frequency and the VCO frequency divided by the prescaler and programmable divider are compared by the digital phase comparator. Since the output pulse cannot be connected directly to the active filter. The PD output is fed out of the complimentary switching circuit (charge pump) which consists of a n-channel MOS FET and a p-channel MOS FET.

The charge pump is characterized by 3 modes:
(1) When the p-channel is OFF and n-channel ON
(2) When the p-channel is ON and n-channel OFF
(3) When the unit is floating with both p- and n-channels OFF

A plus pulse and a minus pulse are fed out onto the DC voltage.
In mode (1), Q41 and Q42 turn OFF when the minus pulse is fed out and the Q42 collector voltage rises. Next, C93 and C94 charge, the tuning voltage increases and the reception frequency moves up the scale.
In mode (2), Q41 and Q42 turn ON when the plus pulse is fed out, and the Q42 collector voltage falls. As a result, the reception frequency moves down the scale.
Mode (3) signifies that the loop is locked. However, the output pulses are such that the above three modes are repeated all the time even when the loop is locked, and the locked loop state is maintained.

• Display Control Section

A dynamic lighting system is adopted for the PD7004 display with the LEDs being lighted in synchronization with the D1 through D6 (PD7004 pin 28 through pin 23) digit signals. A sweep is performed in a period of about 3 msec. The digit signals, used to indicate the digits (D1 = 1st digit; D2: 2nd digit), are fed out from PD7004. The LEDs employed for displaying the numbers are composed of 7 segments and, with the addition of the dot [.], the 8-segment output is fed out from the IC, the required segments of the LED for lighting are synchronized with the digit output and segment output and turned on, in each case at a period speed of 3 msec, with a sweep being performed from the highest digit to the lowest digit.

The above process is explained using Fig. 10 D1 through D6 are active at "L" and S1 through S8 are active at "H". If the description is simplified and confined to one LED, then, as in Fig. 10, the LED lights only when the digit output is "L" and the segment output is "H."

More specifically in the above figure when digit output Dn (IC output) is "L," the Q23~Q27 Darlington pnp transistors turn ON and when the segment output Sn is "H," IR2403 and Q37 turn ON, segment 1 of the LED lights. For instance, when the first digit output goes to "L", and segments (2) and (3) go to "H", "8" is indicated and lighting is repeated as in Fig. 12 at a speed of 3 msec.

Distributing a signal to multiple digit lines by turns is called dynamic lighting.

In the dynamic system, much fewer IC pins are used than with the static lighting system where each of the segments is lighted with a DC voltage. However, the dynamic signal which causes the lighting is a 5Vp-p square wave and so care must be taken lest it should not interfere RF and power supply circuit.

The frequency, clock, band and channels are indicated by the above method.

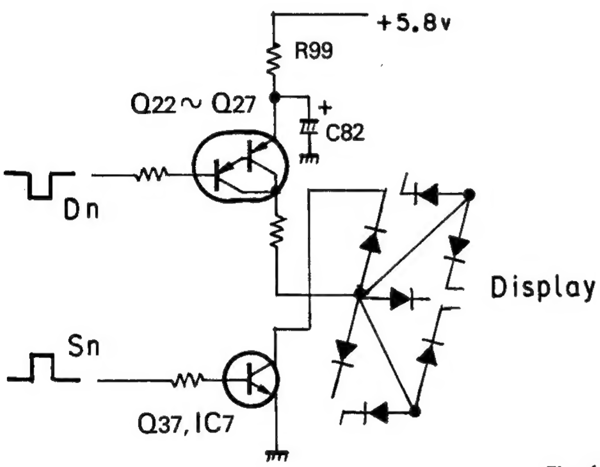


Fig. 10

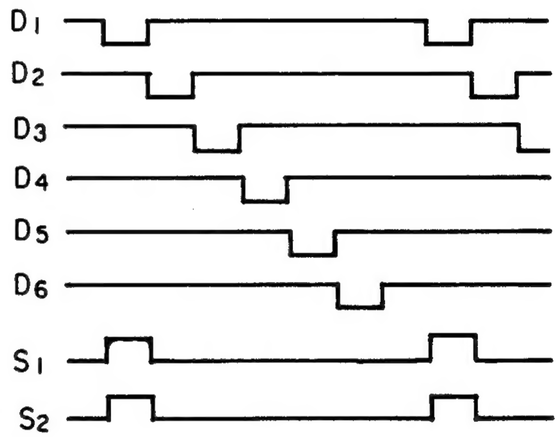


Fig. 12

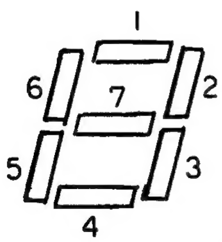


Fig. 11

• Switch Matrix

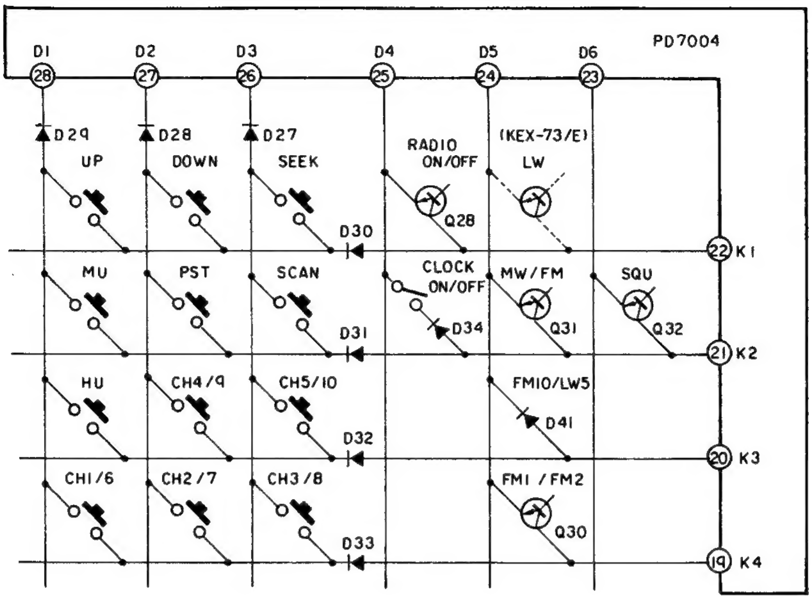


Fig. 13

All the functions of the KEX-70/E including scanning, seek, memory and band (display) selection are controlled by the PD7004 by sensing its D1~D6 display signals at the pin 22 through pin 19 or key sensing inputs k1 through K4.
When changing over to AM (MW), for example, D5 and K2 are not connected unless Q13 is turned ON. Q28 connects D4 and K1 and unless this turns ON, the radio does not come on and the frequency is not displayed.
The nine diodes, D27 ~ D34 and D41, are designed to safeguard against malfunctions caused when the touch-type switches are depressed twice.

• Scan Operation

When the SCAN key is depressed with the radio on at the FM 1 position (with Q30 and Q28 ON), PD7004 is set to the SCAN mode and the frequency division ratio N of the programmable divider increases one step at a time during a fixed time period. Due to the phase-locked loop configuration the tuning voltage also rises and the reception frequency moves up the frequency scale. The absence or presence of broadcasting stations is identified by PD7004 which judges whether or not Q32 has turned ON with every 1-step change, and N is stopped from changing. In other words, the scanning operation can be stopped by turning Q32 ON when a station has been picked up.
Pin 11 of the PA4007 IC, serving as the open collector output, is set to the open state when a station is tuned in, and Q32 turns ON. When no station is tuned in, it is shorted, and Q32 goes OFF. It is set to the hold state when Q32 goes ON during the seek and scan operations by virtually the same operation.
The procedure is the same for AM reception.

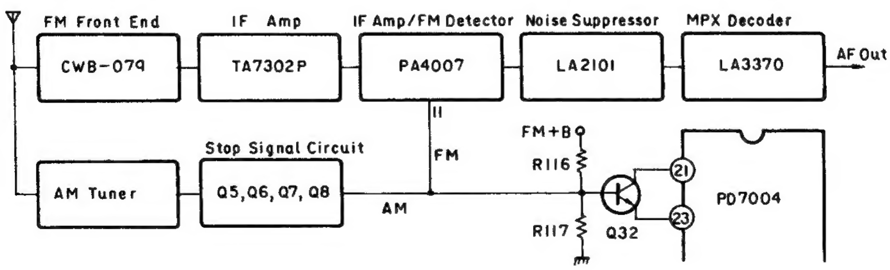
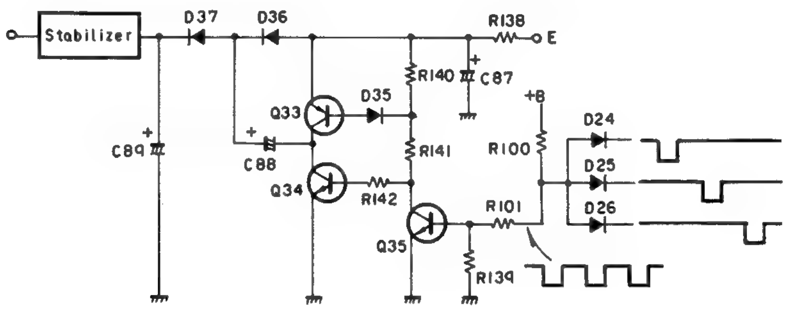


Fig. 14

• DC-DC Converter

When the battery voltage has dropped, a voltage of approximately 11V is provided from the tuner HC power supply to power the loop filter circuit used to generate the tuning voltage. This is to prevent the tuner's tuning frequency from changing. The digit signals fed out from the control IC PD7004 are used as the switching signals, and a voltage doubler circuit is configured combining the transistor switches and electrolytic capacitors.
Fig. 15 shows a simplified view of the DC-DC converter and also a description. D36, D37, Q33 and Q34 are switching diodes and transistors and D36 and D37 are driven by drive transistor Q35. D1, D3 and D5 digit signals are applied to the base of this transistor and a virtually square wave signal is produced by the D24 ~ D26 diode OR circuit. As a result, Q35 repeatedly turns ON and OFF and so Q33 and Q34 turns ON and OFF alternately. Ths result is now detailed using the description figure. First, in the switch circuit indicated by the solid line, the situation is the same in equivalent terms as when Q34 turned ON, the current from power supply E passes through D36 and C88 is charged.
Next, when Q33 turns ON (in the case of the dotted lne), the voltage of power supply E and the charging voltage of C88 are connected in series, they pass through D37 and exactly double the E voltage is charged in C89. In the next period, D37 turns OFF so that the C89 charging voltage does not flow back, C88 is charged (solid line) through D36, C88 and Q34, and the whole operation is repeated.



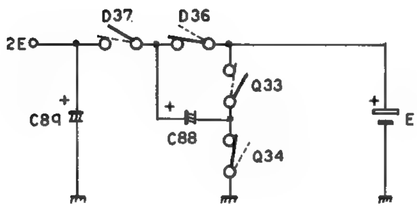


Fig. 15

2.5 DISCRIPTION OF OTHER CIRCUITS

• PNS and MPX Decoder

IC2 LA2101 is an FM noise canceler IC in a 16-pin DIP package. The FM detection output enters pin (1) while a low-pass filter is configured by the RC elements across pins (2) and (3). This filter circuit functions to allow signals with a frequency of less than 100 kHz to pass through and also to delay the signals.
The RC elements across pins (2) and (15) configure an active high-pass filter which takes out noise components with a frequency of over 100 kHz. The IC's signal path gate circuit is switched ON and OFF by these noise components which cuts out the signals for a short period of time only when there is noise present. The above-mentioned low-pass filter is used since it is necessary to delay the signal for the time until noise detection is made. Since the 19 kHz pilot signal is also cut out by this process, the IC contains a circuit that generates a 19 kHz signal at pins (7) and (8) to get pilot signal and stereo separation.
The IC3 LA3370 FM stereo demodulator functions so that when the stereo composite signal accompanied by the 19 kHz signal enters, the VCO inside the IC is locked onto the 19 kHz frequency, a signal with double the frequency (38 kHz) is created, the 38 kHz carrier is injected into the carrier-suppressed double side band (CSDSB) stereo signal, this is detected as AM, the stereo (L-R) sub channel is matrixed with the (L + R) main channel and L and R signals are taken out by:

$(L + R) + (L - R) = 2L$
$(L + R) - (L - R) = 2R$

This IC also contains a circuit that attenuates the sub channel (L − R) with the voltage applied to pin 7 of the IC.
The voltage of pin 3 of FM IC PA4007, FE IF Unit (CWE-421) is applied to pin 7 of LA3370 and varies in proportion to ANT input. VR4 (Tuner Control Unit) is to be adjusted to obtain L→R and R→L separations of 5 dB when ANT input is 20 dBμV.
When the level is increased from this ANT input level, the separation is continuously improved and a separation of about 40 dB is produced at a level of 60 dBμV.
The signal meter output is applied to pin (8) and when the audio components of the stereo demodulated output low, a high-cut circuit works and a drop of about 3 dB is marked from the de-emphasis at 10 kHz with an ANT input level of 25 dBμV.
The FM output signal fed out from pin 6 (Rch) and pin 5 (Lch) of the LA3370 MPX IC passes through the R61/C59 (Lch) and R60/C60 (Rch) de-emphasis circuits. It then passes through the Q9 and Q10 active filters where the 19 kHz and 38 kHz signals as well as other components which adversely affect the sound quality are removed.

• AM Tuner (KEX-70)

This is PLL synthesizer tuner using the LA1130 IC for AM reception.
The ANT input signal is received asynchronously at Q1 and the 50 Hz power line induction is cut out by the high-pass filter composed of capacitor (IB1) and L1. The Q1 output passes through the resonance circuit composed of TC1 trimmer, variable capacitance diode D3 and the T1 secondary coil, and it enters pin 3 (RF input) of the LA1130 IC1. The RF signal amplified by the RF amplifier inside this IC is fed out from pin 5.
The signal passes through the resonance circuit composed of the T3 primary coil, variable capacitance diode D6 and TC2 trimmer, and enters pin 6 of IC LA1130. The local oscillator circuit is activated by the resonant frequency determined by the combined capacitance of variable capacitance diode D5, C11, C12, C71 and C105 and the T2 inductance. This oscillation voltage is impedance-converted by the Q4 buffer amplifier and fed into pin 11 of IC6 PD7004 as the VCO output. The AM-PD output signal from pin 13 of IC6 PD7004 is turned into DC by the Q43 and Q44 loop filter. The tuning voltage is applied to the cathode side of variable capacitance diodes D3, D5 and D6, a loop is formed and this is locked.
The oscillation voltage is fed into pin 4 of IC1 LA1130, it is mixed inside the IC with the RF signal supplied from pin 6 and converted into a 468 kHz IF frequency. The MIX signal fed out from pin 8 enhances the selectivity when it passes through pins 9 and 11. It is then amplified by the IF amplifier inside the IC between pins 9 and 11, and it enters pin 12 via T5. The signal is sent to the detector circuit inside the IC from pin 12. The LA1130 IC1 has a detector circuit inside but since a scan stop circuit is configured, the detector circuit inside the IC is not used. Instead the detection diode is connected to IC pin 14. As a result, the IF signal appears at this pin.
After having passed through the detection diode D9, the signal is fed out as the AM output from pin 2 of the tuner control unit to pin 15 of the amplifier unit.
The scan stop signal is taken out from the anode side of D9, it passes through VR1 and is amplified by the Q5, CF1 and Q6 IF narrowband amplifier. It is + rectified by D10 and − rectified by D11, and is applied to both ends of C30. By applying the signal to both ends of C30, the ripple (audio) components in the rectified output are reduced and the chance that scanning sensitivity deviation caused by the AM modulation will be generated, is reduced.
The rectified output is entered into the Schmitt circuit composed of Q7 and Q8 and the circuit's output is used as the stop signal.
When the ANT input signal enters, a positive voltage is formed at the + side of C30 and a positive voltage is applied to the base of Q7. Q8 turns OFF. As a result, the Q8 collector is set to "H," and a positive voltage is formed at the Q32 base. Once such a voltage is formed at the Q32 base, Q32 turns ON, D6/K2 of IC PD7004 is energized and the scanning operation is stopped.

• MW/LW Tuner Section (KEX-73)

In terms of constants the MW circuitry is virtually the same as that of the conventional voltage synthesizer tuner. The ANT input is received by the Q2 FET, and the 50 Hz power supply induction is cut out by the capacitor (IB1) and L1 high-pass filter. The resonance circuit composed of the T1 secondary coil, D3 variable capacitance diode and TC1 trimmer and the resonance circuit composed of the T2 primary coil, D5 variable capacitance diode and TC2 trimmer form a double-tuned circuit with the C6 capacitor, the selectivity is enhanced and the image is improved. The Q8 local oscillator circuit generates a signal with feedback to the T8 secondary with C30 from the Q8 drain and the resonance circuit composed of variable capacitance diode D15, C34, 38, 39, 41 and the T8 primary coil. This output is amplified by VCO amplifier Q49, fed into pin (11) of PD7004, turned into DC from the AM PD output by loop filter Q47 and Q48, the tuning voltage is then applied to the MW D3, D5 and D15 variable capacitors, a loop is formed and locked.
The oscillation voltage passes through C12 and the T2, T4 secondary for injection at the Q3 base, it is mixed with the input signal, converted into a 468 kHz IF frequency, it then passes through a 4-element ladder ceramic filter CF1 with excellent selectivity, amplified by Q4 and Q5, detected by the diode D7 and it forms the MW output. At the same time, the carrier rectified voltage becomes a negative voltage at the anode side of the diode, it passes through R14 and then through R11 to the Q5 base, it is applied to the Q4 base and when the ANT input voltage increases, the rectified negative voltage increases, Q5 and Q4 are both taken in the cutoff direction, the gain of Q5 and Q4 is reduced and an AGC circuit is composed to deal with strong signal inputs.

468 kHz signal is taken from T6's secondary winding, lead to scan sensitivity adjustor VR1, amplified by Q8, positively rectified by D8 and become the output of MW scan stop.
Th signal is negatively rectified by D9, mixed by C26 and the + side of the AM envelope, the ripple (audio) component in the rectified output is minimized and the difference in the scanning sensitivity due to the AM modulation degree is reduced.
Scan stop output is applied to R34. When an MW ANT input signal is available, a positive voltage is produced at R34, it passes through R177, it is applied to the Q35 base, Q35 is turned ON, PD7004 D6/K2 is closed just as with FM reception and the scanning is terminated.

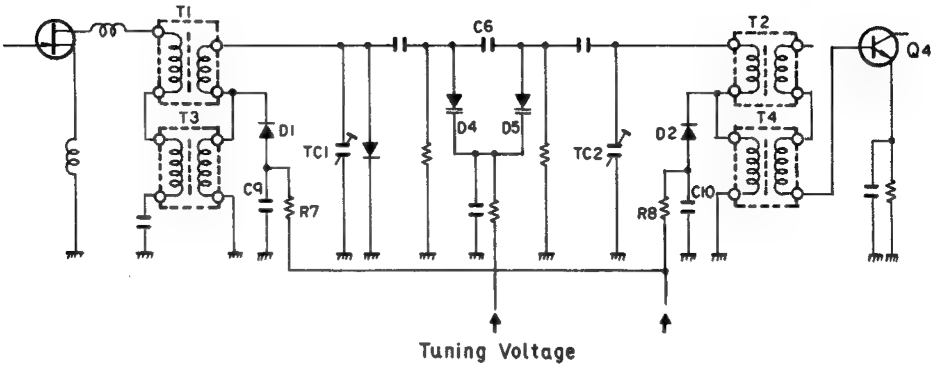


Fig. 16

MW mode

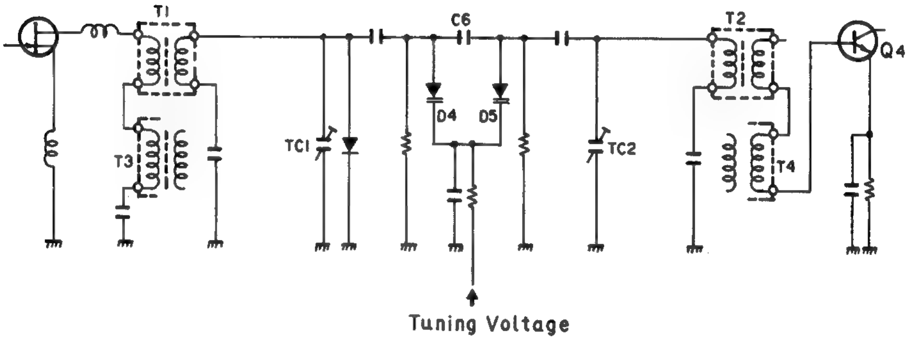


Fig. 17

LW mode

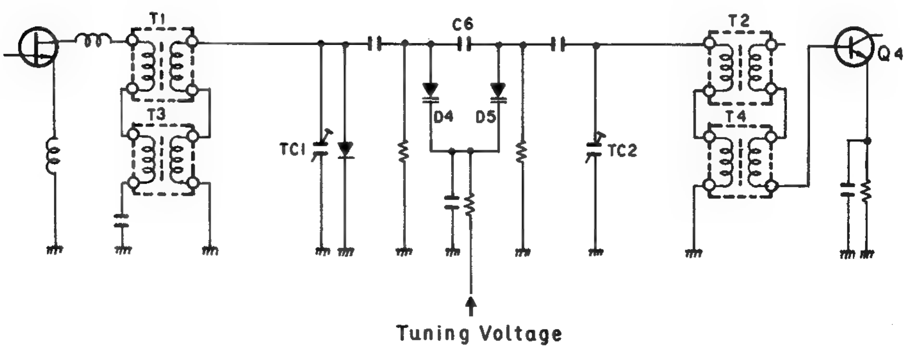


Fig. 18

Local OSC circuit

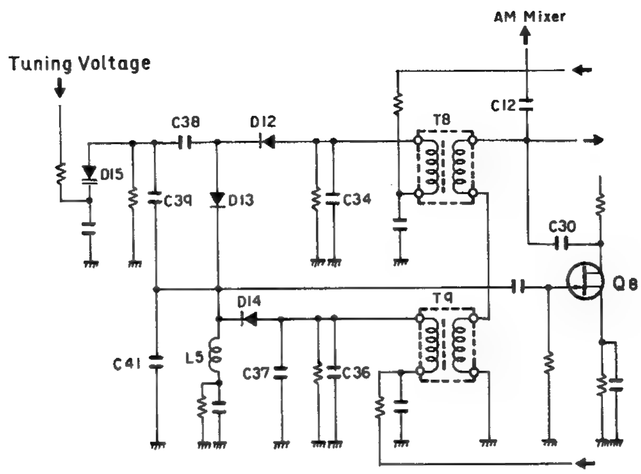


Fig. 19

MW mode

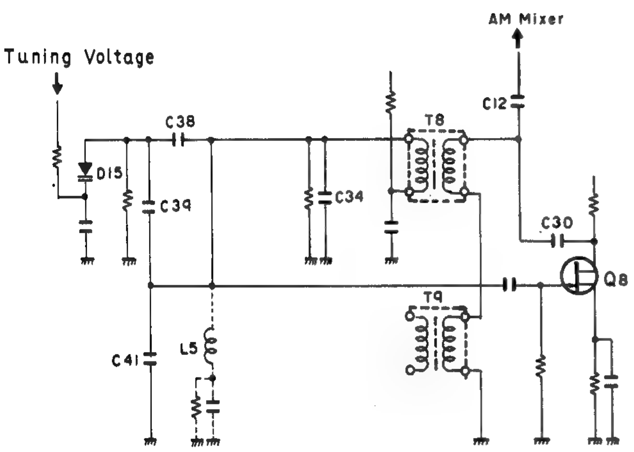


Fig. 20

LW mode

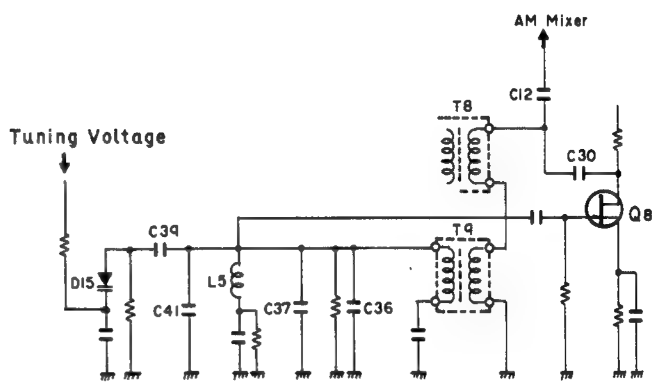


Fig. 21

• LW Circuitry (KEX-73)

Due to the PD7004 switch matrix "LW" display provides selection to LW by the D5/K1 transistor switch Q34 and, following this, D5/K3 of the 5 memory stations for LW is set to open and the stations put in the LW memory.
With MW reception, D1 and D2 turn ON, T3 is shorted in AC terms by C9, T4 is shorted by C10; with LW reception, the tuning inductance is such that T1 and T3 form a series and T2 and T4 form a series.
During LW reception the local oscillator's D14 turns ON and the oscillation frequency is determined by the tuning circuit composed of the C36, C37, C41, C39 and D15 (variable capacitance diode) and T9 and L5 and, as with MW reception, the signal is applied to PD7004 through the Q49 VCO amplifier.
The LW tuning voltage is about 3 V to 7.5 V between 153 kHz and 281 kHz to enable tracking. As far as the PLL locking during LW reception is concerned, there is no problem as long as tracking is enabled in an MW tuning voltage range of 0.9 to 8.8 V.

2.6 BLOCK DIAGRAM

- **KEX-70**

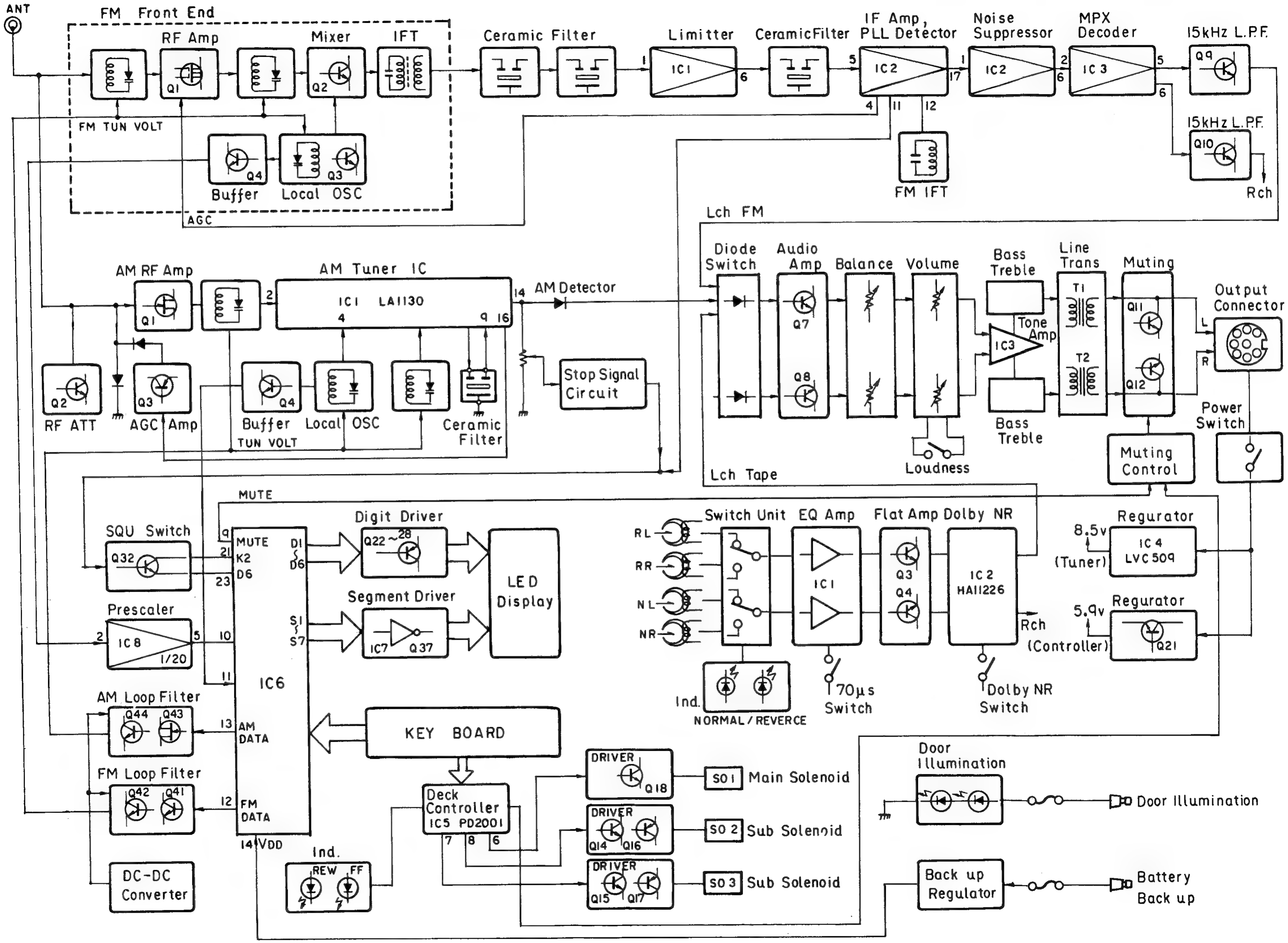


Fig. 22

• KEX-73

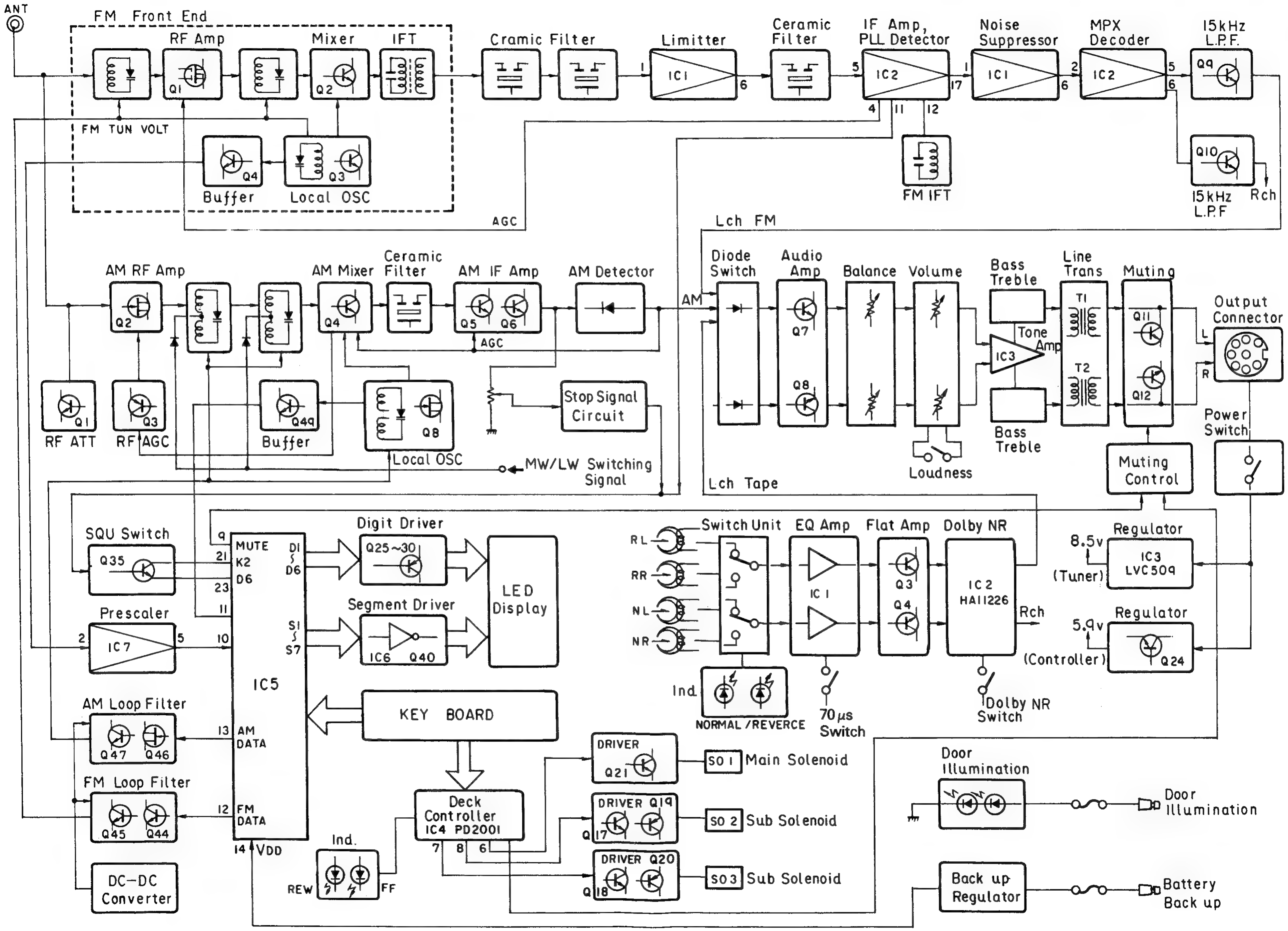

ANT
FM Front End
RF Amp
Mixer
IFT
FM TUN VOLT
Buffer
Local OSC
AGC
Cramic Filter
Limitter
Ceramic Filter
IF Amp, PLL Detector
Noise Suppressor
MPX Decoder
15kHz L.P.F.
FM IFT
15kHz L.P.F
Rch
Lch FM
AM RF Amp
AM Mixer
Ceramic Filter
AM IF Amp
AM Detector
RF ATT
RF AGC
Buffer
Local OSC
Stop Signal Circuit
MW/LW Switching Signal
Diode Switch
Audio Amp
Balance
Volume
Bass Treble
Tone Amp
Line Trans
Muting
Output Connector
Loudness
Bass Treble
Power Switch
Muting Control
Lch Tape
SQU Switch
Prescaler
AM Loop Filter
FM Loop Filter
DC-DC Converter
IC5
MUTE
AM DATA
FM DATA
VDD
Digit Driver
Segment Driver
LED Display
KEY BOARD
Deck Controller IC4 PD2001
Ind.
REW
FF
Switch Unit
EQ Amp
Flat Amp
Dolby NR
IC2 HA11226
Ind.
NORMAL / REVERCE
70μs Switch
Dolby NR Switch
DRIVER
Main Solenoid
Sub Solenoid
Sub Solenoid
Regulator
8.5v (Tuner)
IC3 LVC509
Regulator
5.9v (Controller)
Door Illumination
Door Illumination
Back up Regulator
Battery Back up

Fig. 23

3. ADJUSTMENT

3.1 CRYSTAL OSC FREQUENCY ADJUSTMENT

• **Connection Diagram (KEX-70)**

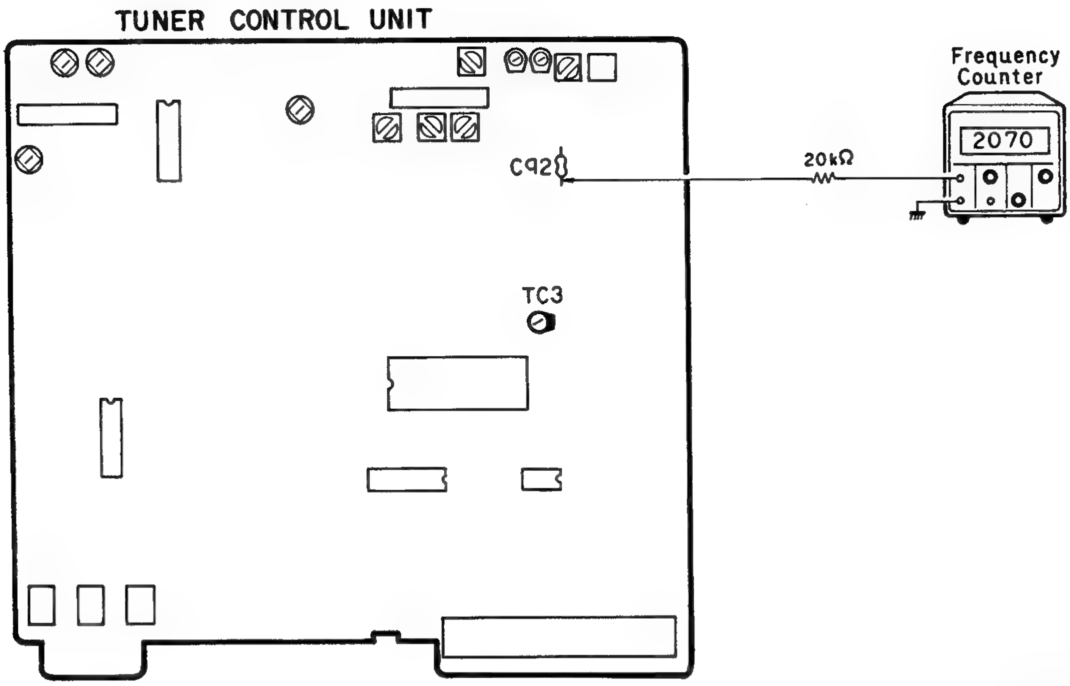


Fig. 24

• **Connection Diagram (KEX-73)**

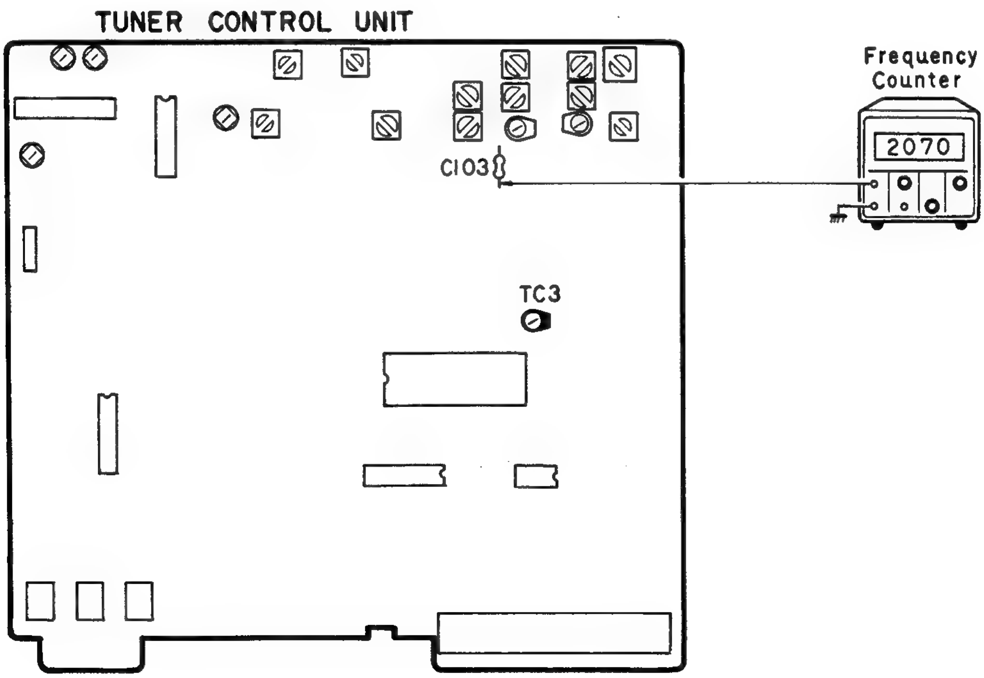


Fig. 25

- **To Adjust**

1. Set the band switch to AM (MW).
2. Set the reception frequency to 1620 kHz.
3. Adjust TC3 so that the frequency counter displays 2070 kHz ± 0 Hz.

3.2 FM IF ADJUSTMENT

- **Connection Diagram**

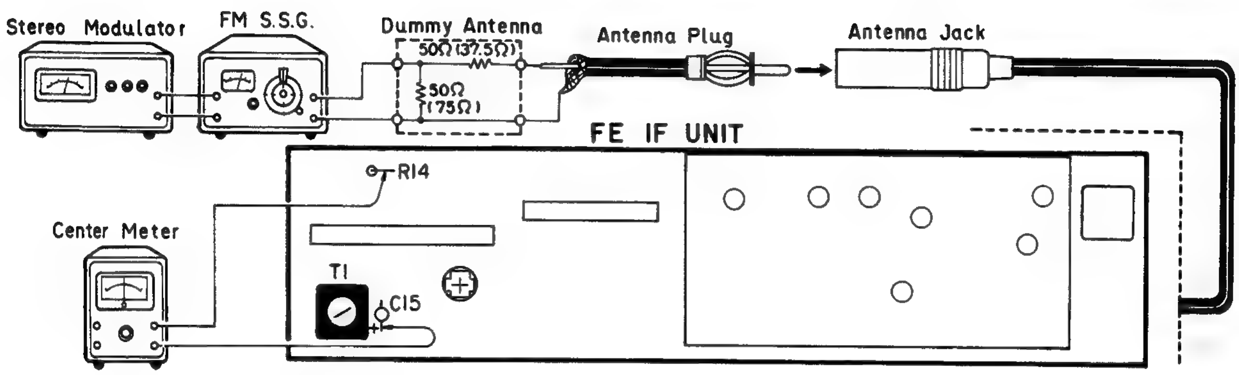


Fig. 26

- **To Adjust**

1. Set the FM SSG to 100% modulation at 400 Hz and supply an output signal of 98.0 MHz, 60 dB (μV).
2. Tune into a frequency of 98.0 MHz and rotate T1 (FE IF Unit) to adjust the center meter pointer to 0.

3.3 FM TRACKING ADJUSTMENT

- **Connection Diagram**

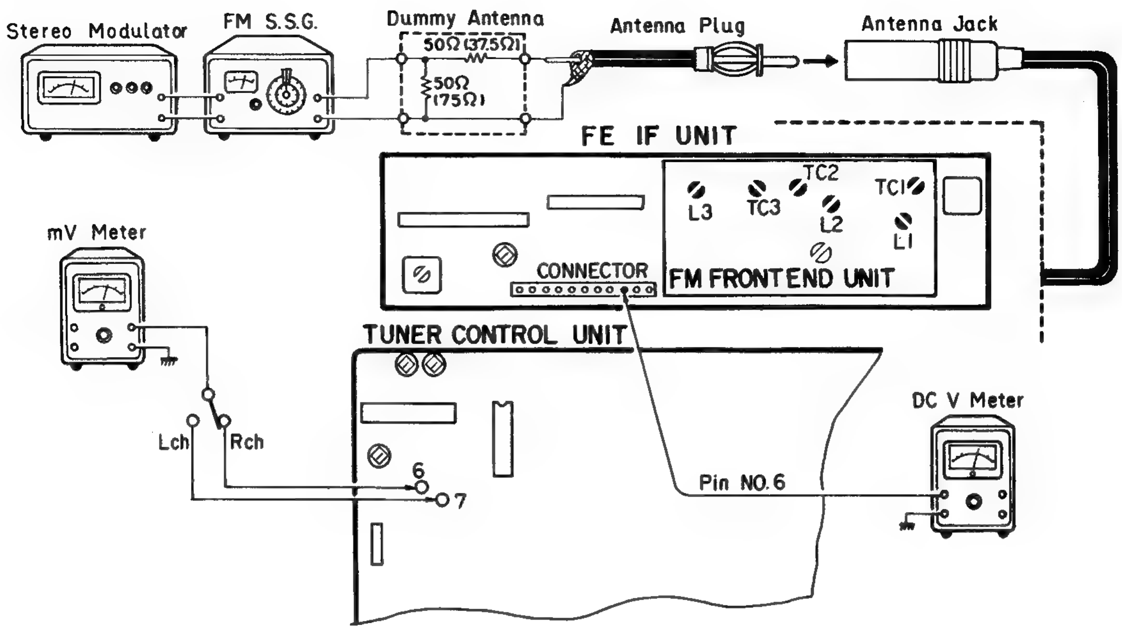


Fig. 27

- **To Adjust**

Set the mono switch to ON (MONO mode).

SSG Frequency	Tuning (frequency display)	Adjustment point	DC V meter	mV meter
1.	108.0 MHz	TC3	8.85 ± 0.15V	
2.	87.5 MHz	L3	3 ± 0.3V	
3. Steps (1) and (2) are repeated, and adjustments made for a DC V meter pointer deflection of 8.85 ± 0.15V at 108.0 MHz and 3 ± 0.3V at 87.5 MHz.				
4. 90.0 MHz (400 Hz, 100% modulation) output level 5 ~ 10 dB (μV)	90.0 MHz	L1, L2		Maximum output.
5. 106.1 MHz (400 Hz, 100% modulation) output level 5 ~ 10 dB (μV)	106.1 MHz	TC1, TC2		Maximum output.
6. Repeat items (4) and (5) alternately so that the mV meter indicates the maximum output.				

3.4 FM MPX ADJUSTMENT

- **Connection Diagram**

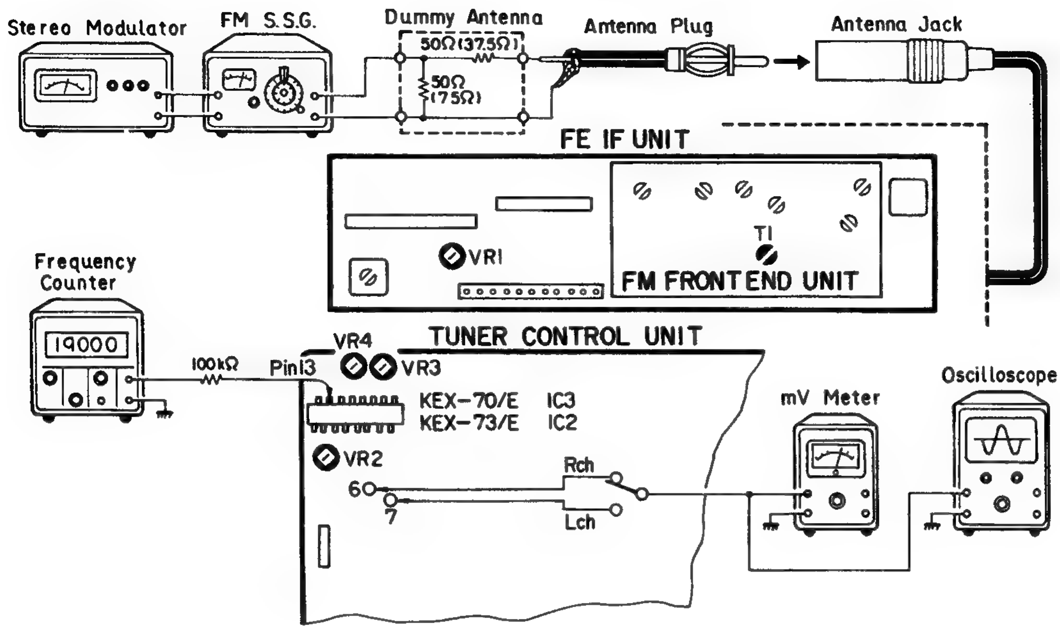


Fig. 28

- **To Adjust**

1. Set the mono switch to OFF (AUTO mode).
2. Supply a non-modulated output signal of 98.0 MHz 60 dB (μV) from the SSG. Tune into a frequency of 98.0 MHz and adjust VR2 so that the frequency counter indicates 19 kHz ±30Hz.
3. Supply a 98.0 MHz (1 kHz, 100% modulation, 67.5 kHz - main, 7.5 kHz - pilot) stereo signal with an output level of 60 dB (μV) from the SSG. Rotate VR3 and set so that the separation is brought to the maximum.
(At this point, rotate VR4 completely in a clockwise direction.)
4. Rotate T1 (FM Front End Unit) and adjust for minimum distortion.

3.5 FM ARC ADJUSTMENT

- **Connection Diagram (shown in Fig. 28)**

- **To Adjust**

1. Set the mono switch to the ON (MONO mode) position and supply a 98.0 MHz 100% modulation signal with an output level of 60 dB (μV) from the SSG. Tune into a frequency of 98.0 MHz and memorize the output.
2. Set the SSG output level to 15 dB (μV) and adjust VR1 (FE IF Unit) so that a reduction of 3 dB is produced from the output level in step 1.
3. Set the mono switch to the OFF (AUTO mode) position, supply a 100% modulated stereo signal at an output level of 60 dB (μV) from the SSG, and check that the separation is at its maximum.
4. Set the SSG output level to 20 dB (μV) and rotate VR4 so that the L→R and R→L separation is set to 5 dB.
5. Set the SSG output level again to 60 dB (μV) and check that the separation is the same as that in step 3.

3.6 FM SCAN (SEEK) SENSITIVITY CHECK

- **Connection Diagram (shown in Fig. 28)**

- **To Adjust**

1. Set the local switch to OFF (DISTANT mode).
2. Set the unit's frequency display to 97.0 MHz and supply a 98.0 MHz (400 Hz, 100% modulation) signal from the SSG. Depress the scan (seek) button and check that the scanning (seek) operation stops with an SSG output range of 29 ±6 dB (μV).
3. Set the local switch to ON (LOCAL mode), repeat step 2 and check that the scanning (seek) operation stops with an SSG output range of 49 ±6 dB (μV).

3.7 AM IF ADJUSTMENT (KEX-70)

- **Connection Diagram**

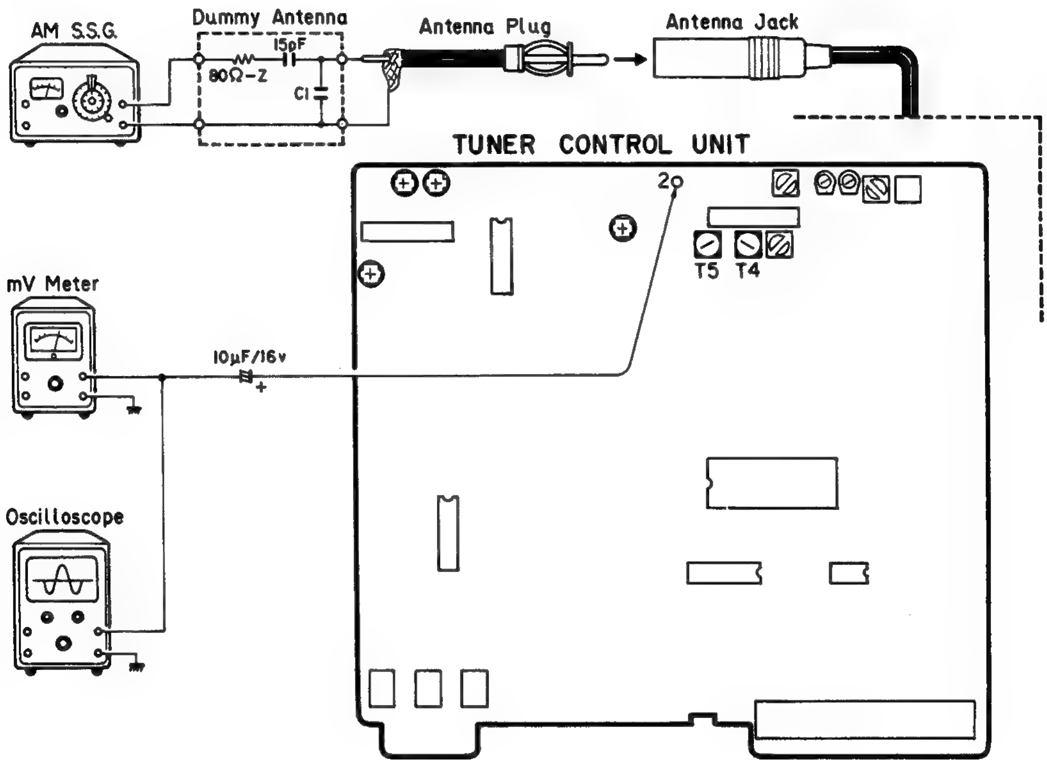


Fig. 29

NOTICE:
Select C1 so that total capacity of 80 pF is attained from the direction of receiver jack.
Z: Output impedance of the S.S.G.

- **To Adjust**

1. Set the reception frequency to 999 kHz.
2. Supply a 468 kHz signal (400 Hz, 30% modulation) from the SSG.
3. Vary the SSG output level to between 80 and 120 dB (μV) and, checking the output on the mV meter and oscilloscope, adjust T4 and T5 to bring the output to its maximum. Reduce the SSG output to the minimum level at which the waveforms can be monitored.

3.8 AM TRACKING ADJUSTMENT (KEX-70)

• Connection Diagram

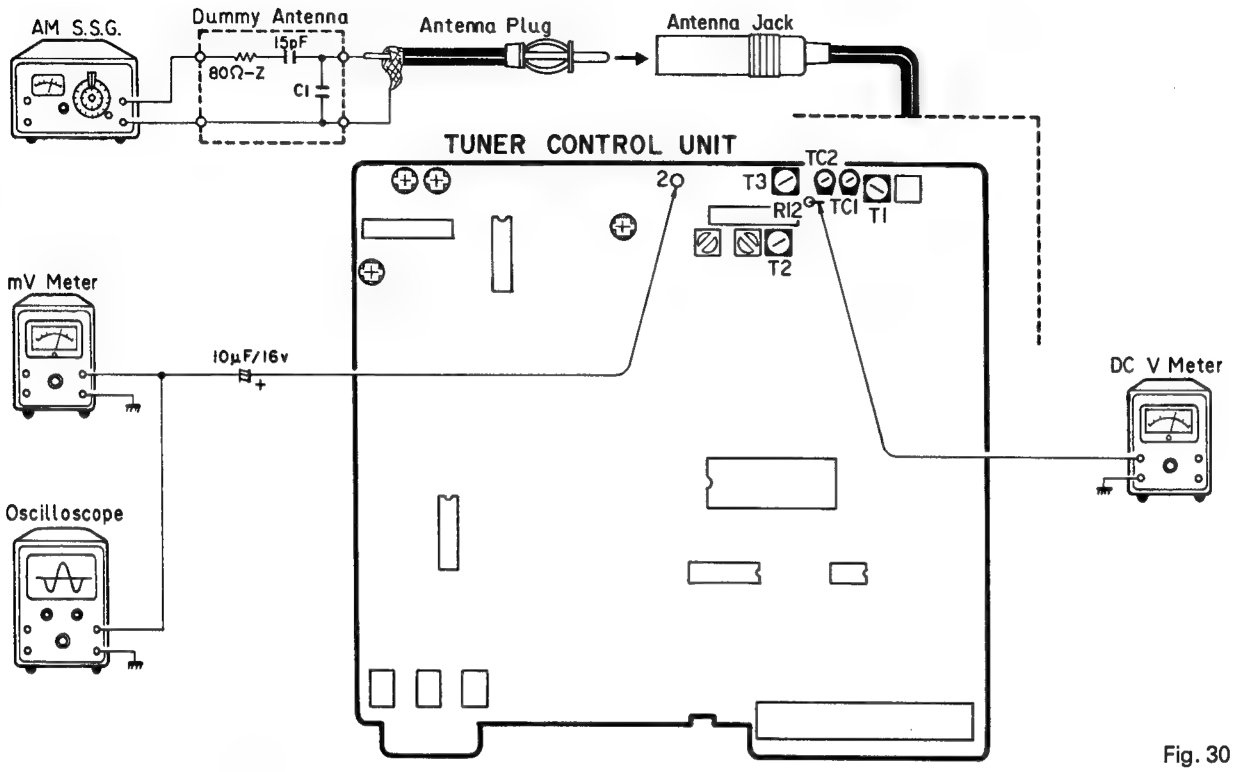


Fig. 30

NOTICE:
Select C1 so that total capacity of 80 pF is attained from the direction of receiver jack.
Z: Output impedance of the S.S.G.

• To Adjust

SSG Frequency	Tuning (frequency display)	Adjustment point	DC V meter	mV meter
1.	1,620 kHz	T2	8.8V ± 0.5V	
2.	531 kHz		More than 0.9V check	
3. 603 kHz (400 Hz, 30% modulation) output level 15 ~ 20 dB (μV)	603 kHz	T1, T3		Maximum output.
4. 1,395 kHz (400 Hz, 30% modulation) output level 15 ~ 20 dB (μV)	1,395 kHz	TC1, TC2		Maximum output.
5. Repeat steps (3) and (4) alternately so that the mV meter indicates maximum output.				

3.9 MW/LW IF ADJUSTMENT (KEX-73)

• **Connection Diagram**

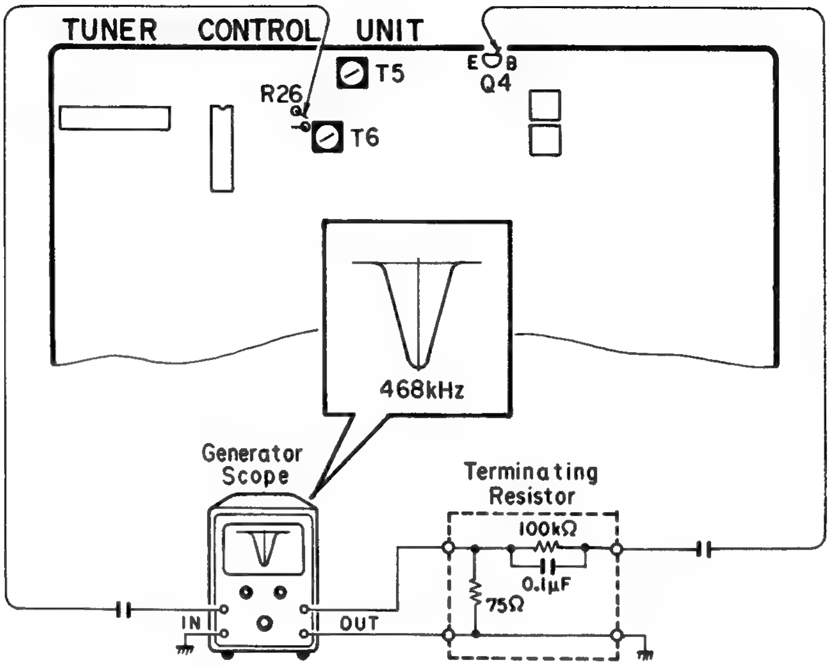


Fig. 31

• **To Adjust**

Set Generator Scope as follows:
Frequency centering on sweep .... 468 kHz
Input level 0.3VP-P/cm
Output level.......................... 3 mV ~ 10 mV

2. Turn the cores of T5 and T6 and adjust so that U-curve will be at maximum amplitude and best symmetry.

3.10 MW/LW TRACKING (KEX-73)

• Connection Diagram

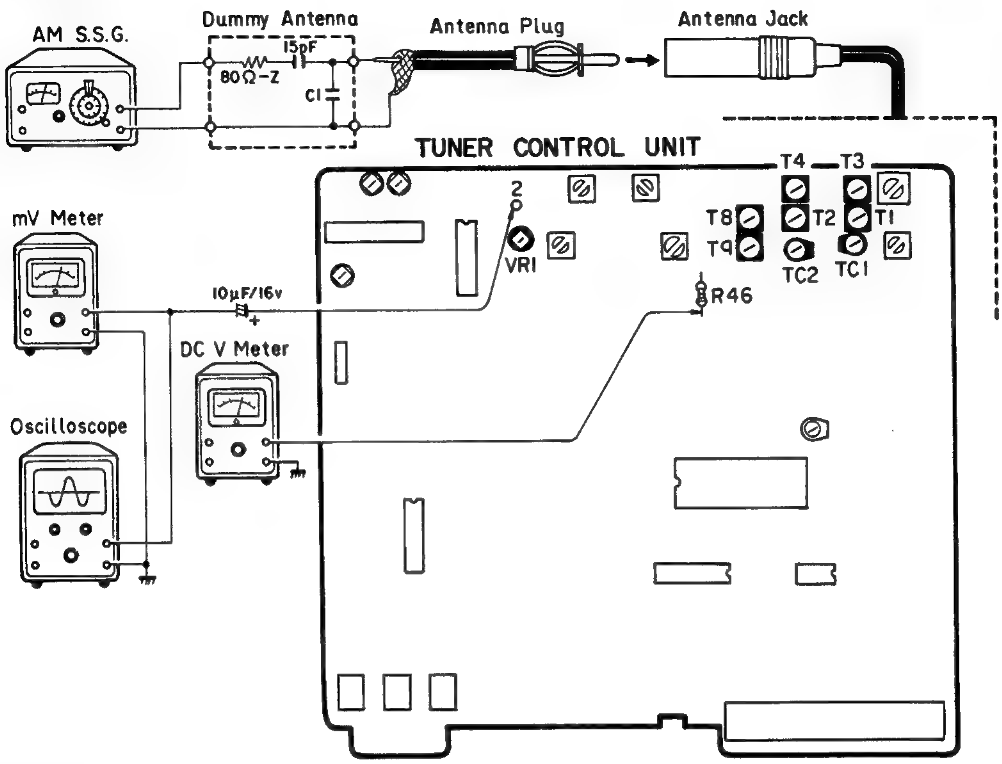


Fig. 32

NOTICE:
Select C1 so that total capacity of 80 pF is attained from the direction of receiver jack.
Z: Output impedance of the S.S.G.

• To Adjust

In case of MW

SSG Frequency	Tuning (frequency display)	Adjustment point	DC V meter	mV meter
1.	1,602 kHz	T8	8.8V ± 0.15V	
2.	531 kHz		More than 0.9V check	
3. 603 kHz (400 Hz, 30% modulation) output level 30 dB (μV)	603 kHz	T1, T2		Maximum output.
4. 1,395 kHz (400 Hz, 30% modulation) output level 30 dB (μV)	1,395 kHz	TC1, TC2		Maximum output.
5. Repeat items (3) and (4) alternately so that the mV meter indicates maximum output.				

In case of LW

SSG Frequency	Tuning (frequency display)	Adjustment point	DC V meter	mV meter
1. 153 kHz (400 Hz, 30% modulation) output level 40 dB (μV)	153 kHz	T9		Maximum output.
2. 281 kHz (400 Hz, 30% modulation) output level 40 dB (μV)	281 kHz	T3, T4		Maximum output.
3. Repeat items (1) and (2) alternately so that the mV meter indicates maximum output.				

3.11 AM (MW) SCAN (SEEK) SENSITIVITY ADJUSTMENT

- **Connection Diagram (shown in Fig. 32)**
- **To Adjust**

1. Set the local switch to OFF (DISTANT mode).
2. Set the unit's frequency display to 900 kHz and supply a 999 kHz (400 Hz, 30% modulation) signal from the SSG. Depress the scan (seek) button and adjust VR1 so that the scanning (seek) operation stops with an SSG output range of 20±4 dB (μV) for the KEX-70 and 26±4 dB (μV) range for the KEX-73.
3. Set the local switch to ON (LOCAL mode), repeat step 2 and check that the scanning (seek) operation stops with an SSG output range of 40±4 dB (μV) for the KEX-70 and 46±4 dB (μV) range for the KEX-73.

3.12 LW SCAN (SEEK) SENSITIVITY CHECK (KEX-73)

- **Connection Diagram (shown in Fig. 32)**
- **To Adjust**

1. Set the local switch to OFF (DISTANT mode).
2. Set the unit's frequency display to 155 kHz and supply a 218 kHz (400 Hz, 30% modulation) signal from the SSG. Depress the scan (seek) button and check that the scanning (seek) operation stops with an SSG output range of 35±8 dB (μV).
3. Set the local switch to ON (LOCAL mode), repeat step 2 and check that the scanning (seek) operation stops with an SSG output range of 55 ±8 dB (μV).

3.13 DOLBY NR LAW ADJUSTMENT

- **Connection Diagram**

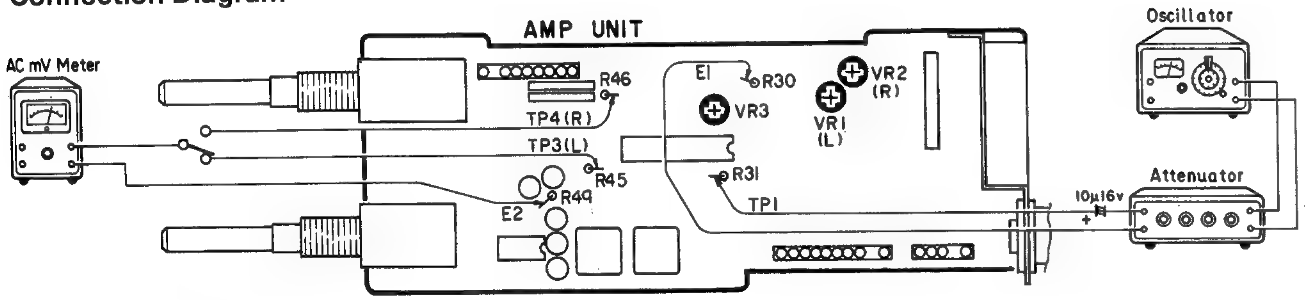


Fig. 33

- **To Adjust**

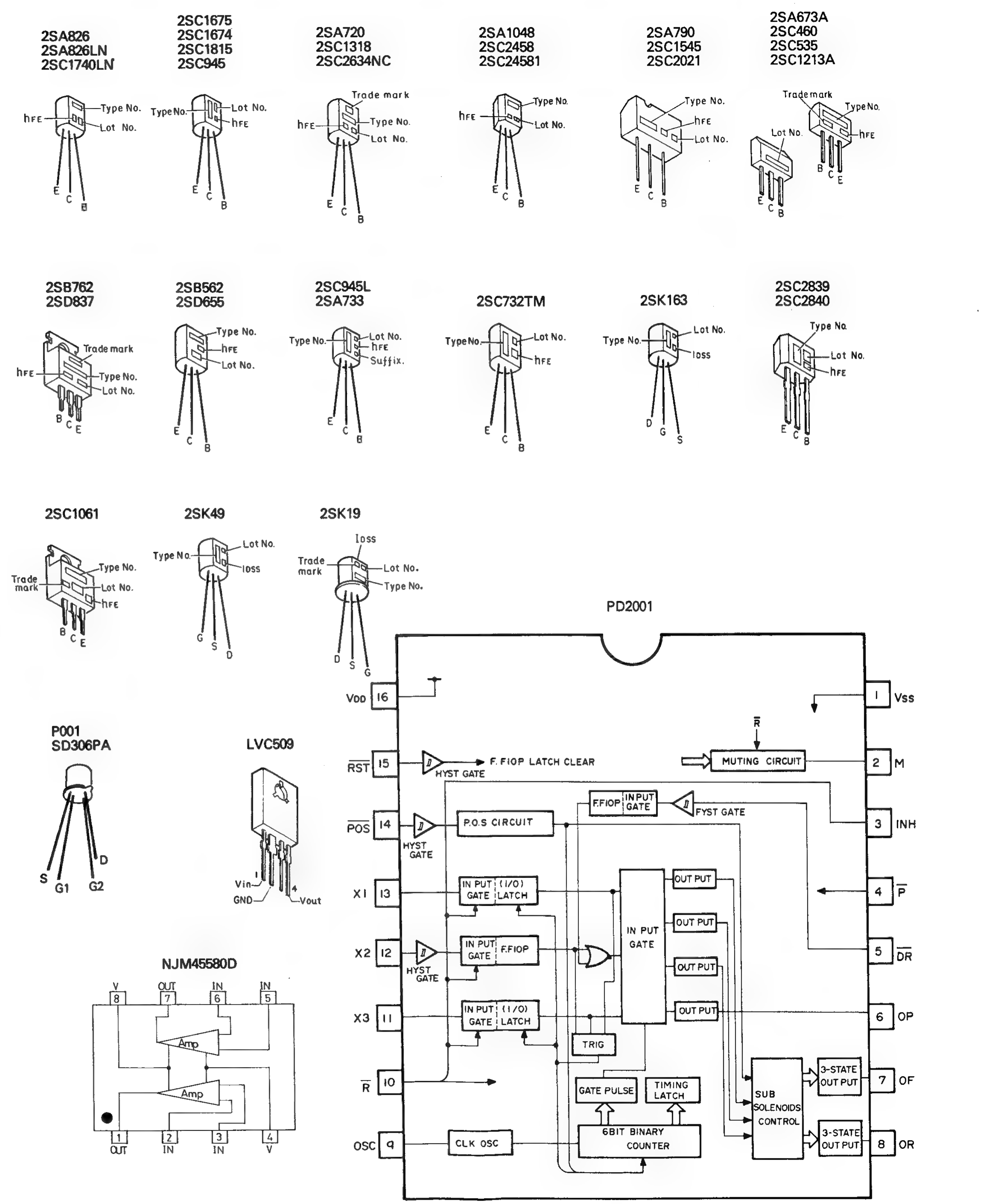
1. Insert a blank cassette tape, and play it.
2. Set the Dolby NR switch to ON and apply a 5 kHz input frequency signal from the oscillator. Adjust the attenuator so that mV meter pointer deflects to 58.7 mV (−22.4 dBs).
3. Now set the Dolby NR switch to OFF and adjust VR3 so that mV meter pointer deflects to 23.4 mV (−30.4 dBs).

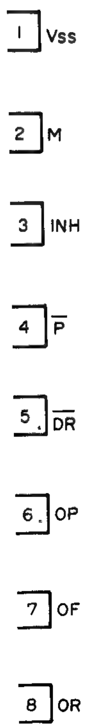
3.14 DOLBY NR LEVEL ADJUSTMENT

- **Connection Diagram (shown in Fig. 33)**
- **To Adjust**

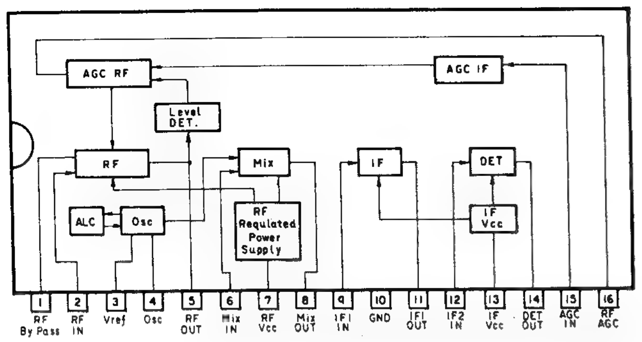
1. Disconnect oscillator and attenuator from TP1.
2. Play back the CT-150 (400 Hz-200 nwb/m) test tape and adjust VR1 (Lch) and VR2 (Rch) so that the mV meter pointer deflects to 775 mV (0 dBs).

- **IC's and Transistor**

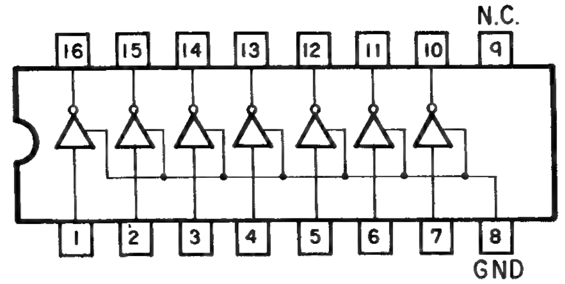




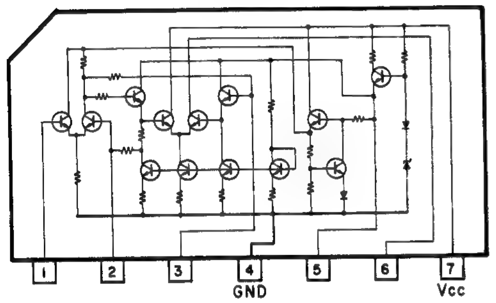
LA1130



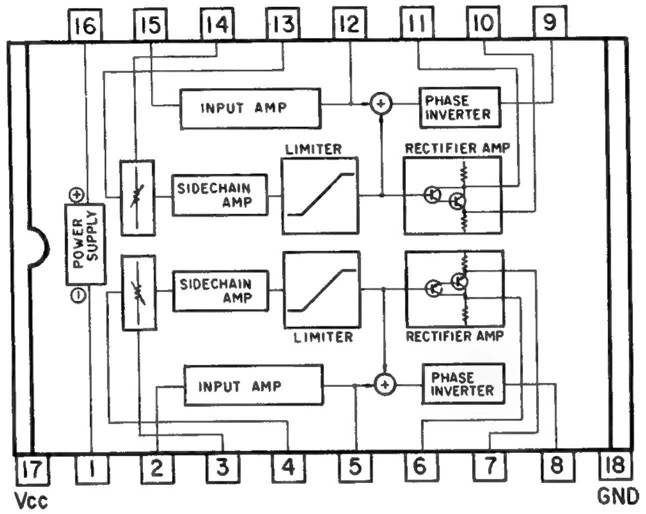
IR2403



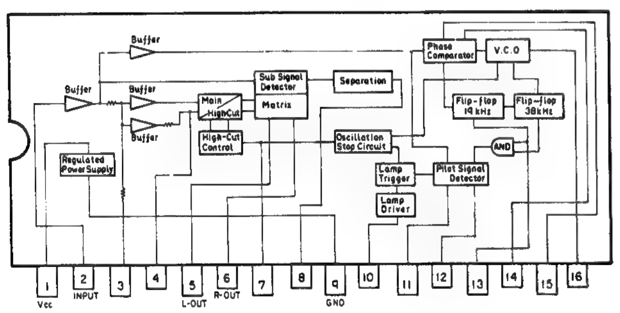
TA7302P



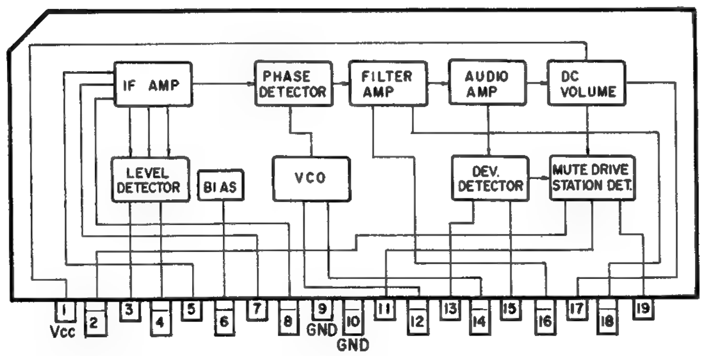
HA11226



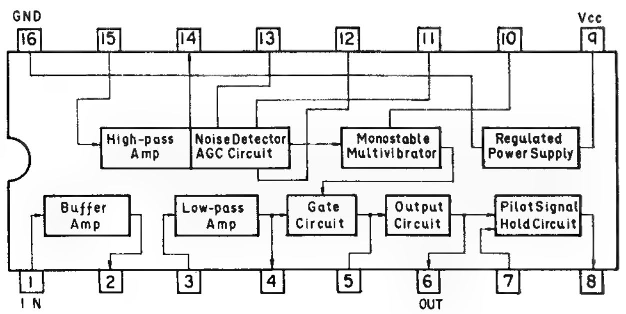
LA3370P



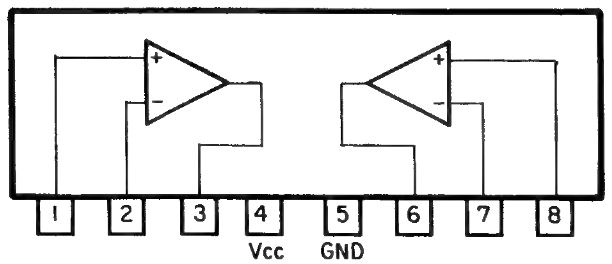
PA4007



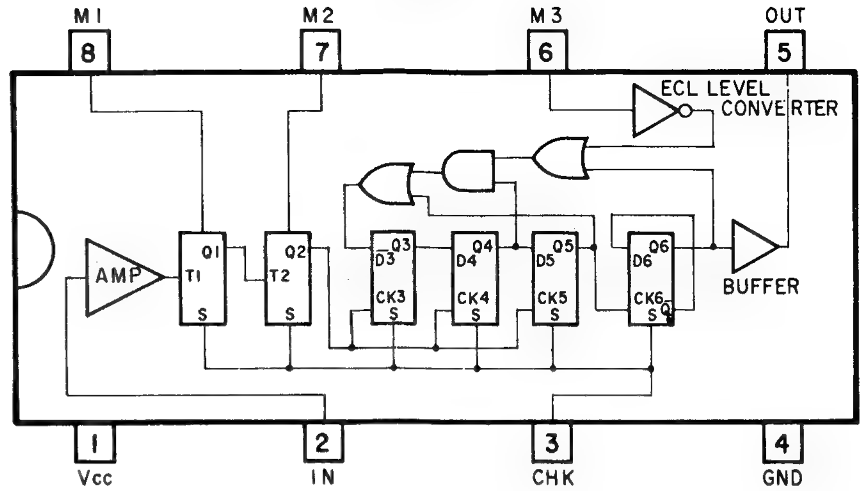
LA2101



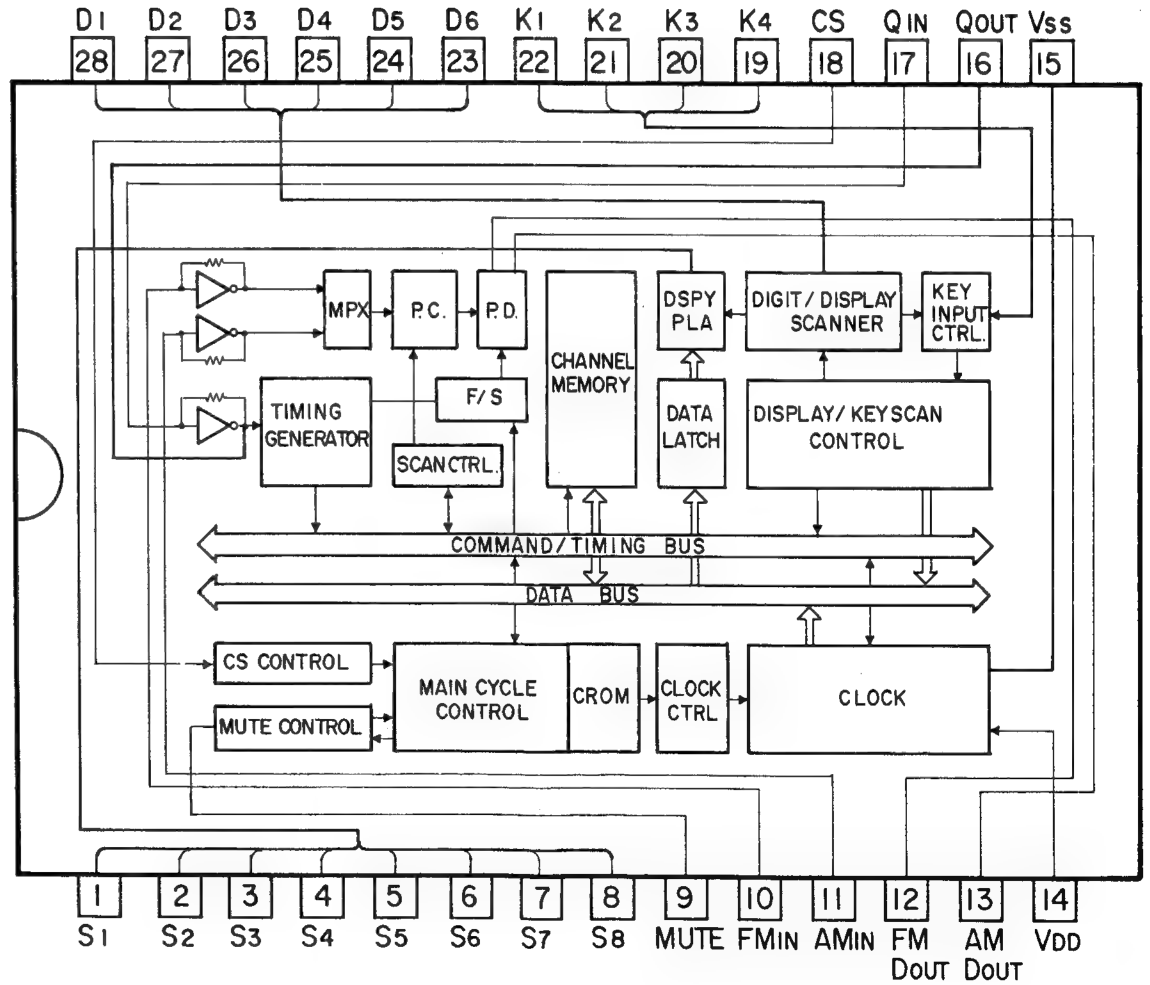
MB3106M



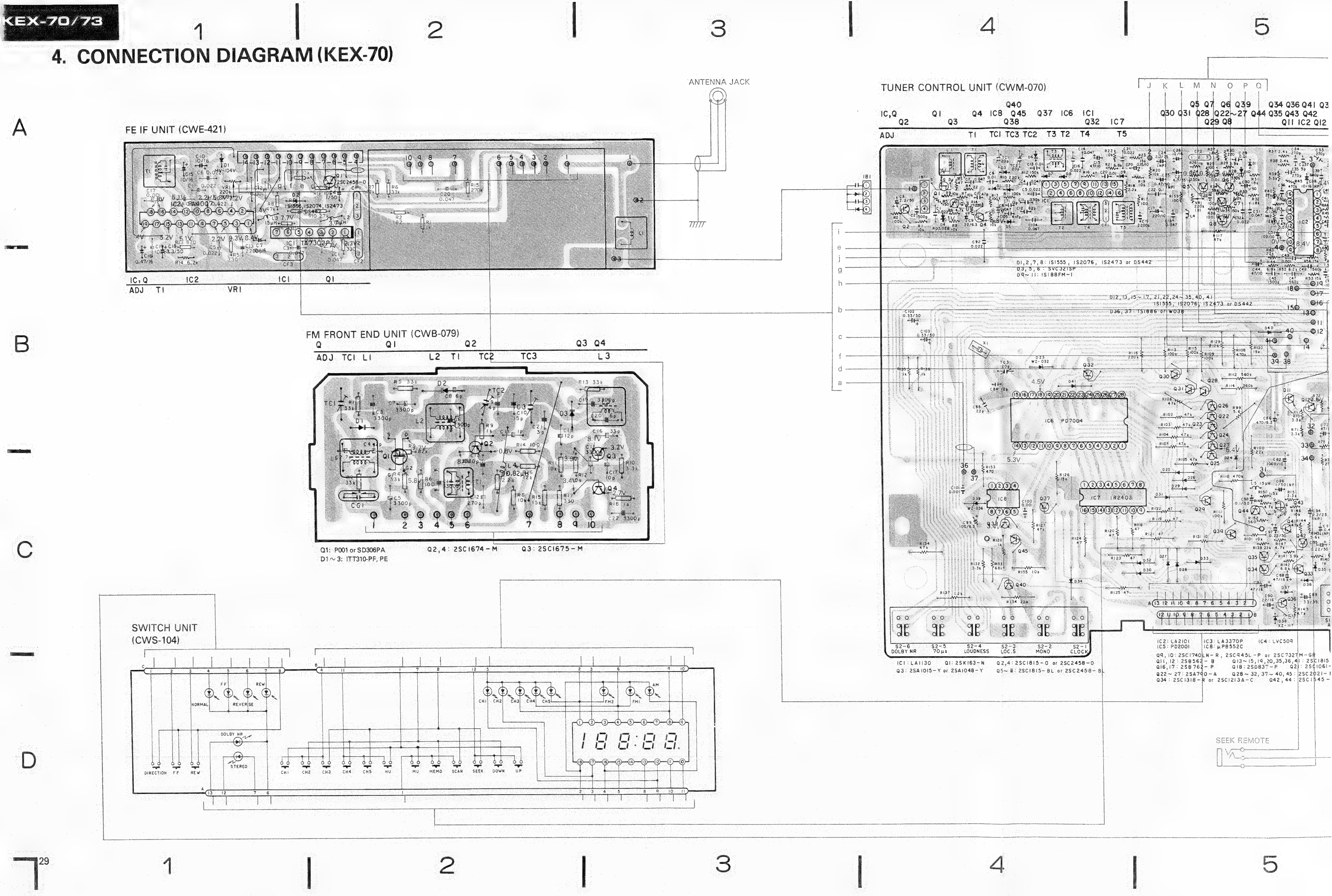
µPB552C



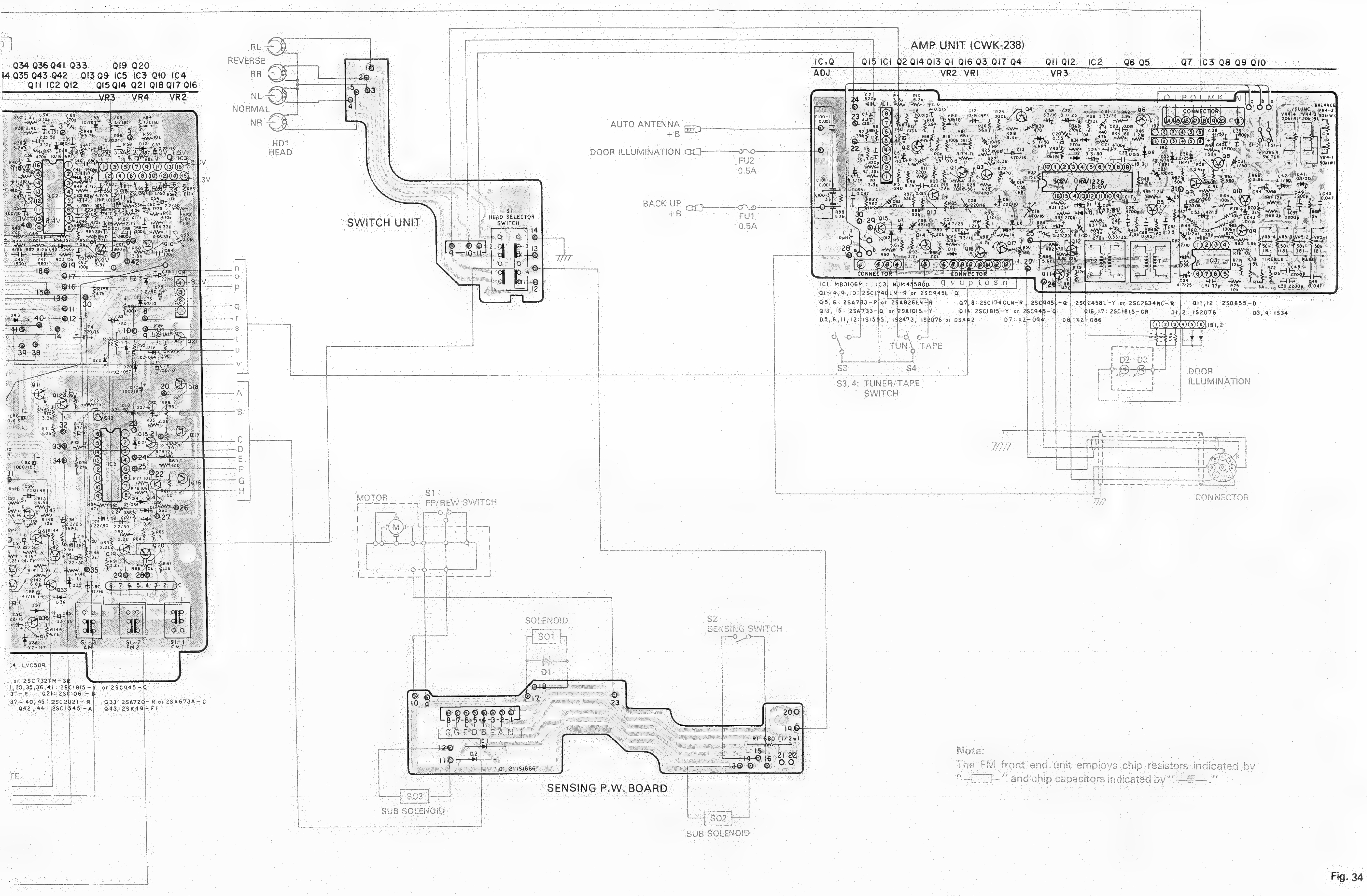
PD7004



4. CONNECTION DIAGRAM (KEX-70)



5 6 7 8 9

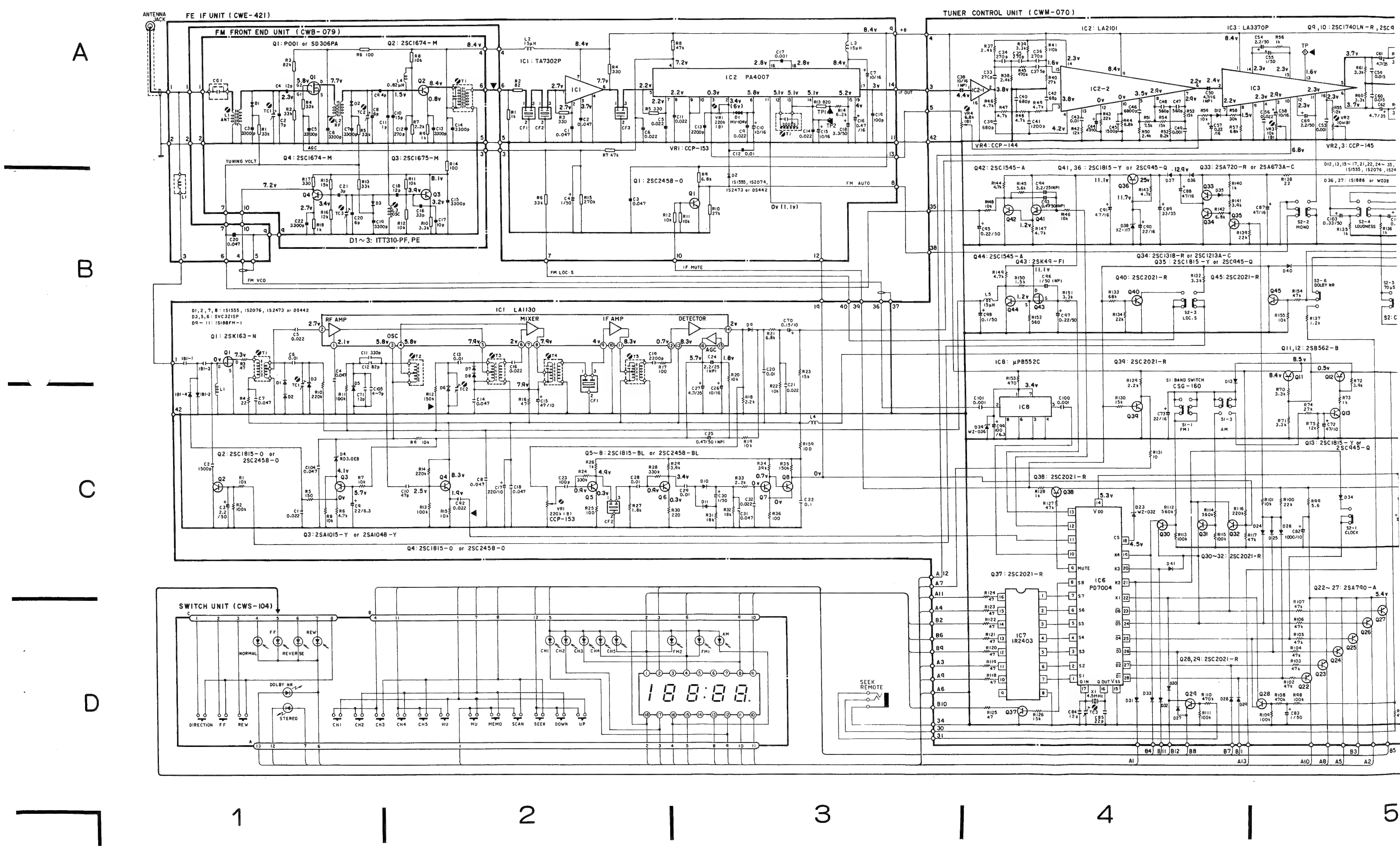


Note:
The FM front end unit employs chip resistors indicated by "–▭–" and chip capacitors indicated by "–▯–."

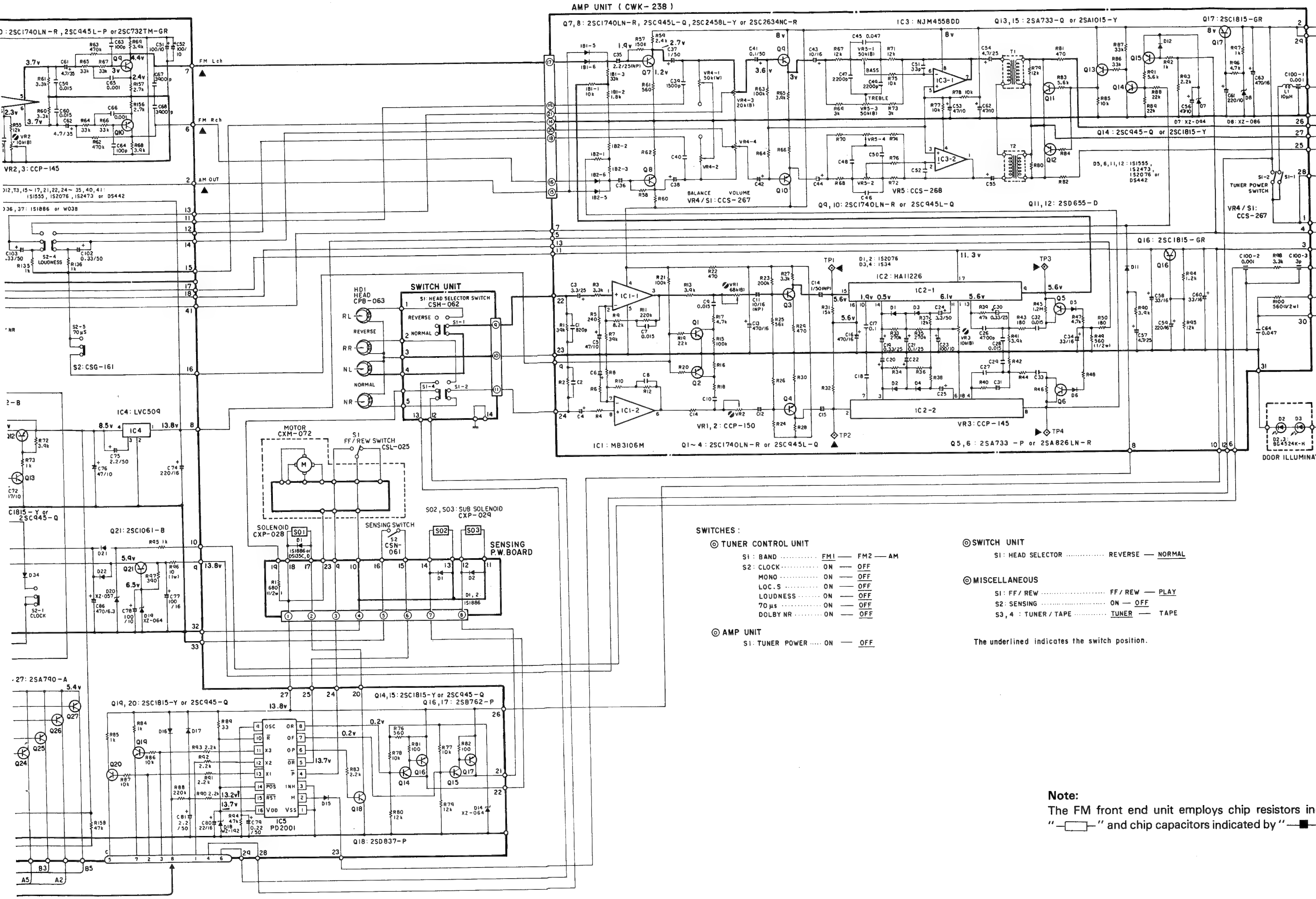
Fig. 34

5 6 7 8 9

5. SCHEMATIC CIRCUIT DIAGRAM (KEX-70)



5 6 7 8 9



SWITCHES :

◎ TUNER CONTROL UNIT

S1 : BAND	FM1 — FM2 — AM	
S2 : CLOCK	ON — OFF	
MONO	ON — OFF	
LOC. S	ON — OFF	
LOUDNESS	ON — OFF	
70 μs	ON — OFF	
DOLBY NR	ON — OFF	

◎ AMP UNIT

S1 : TUNER POWER ..... ON — OFF

◎ SWITCH UNIT

S1 : HEAD SELECTOR .... REVERSE — NORMAL

◎ MISCELLANEOUS

S1 : FF/REW .... FF/REW — PLAY
S2 : SENSING .... ON — OFF
S3, 4 : TUNER / TAPE .... TUNER — TAPE

The underlined indicates the switch position.

Note:
The FM front end unit employs chip resistors indicated by "—▭—" and chip capacitors indicated by "—■—."

Fig. 35

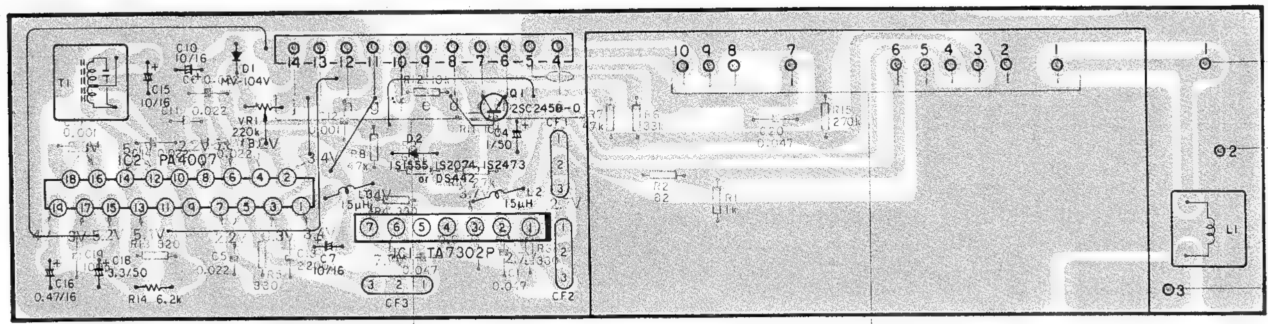
5 6 7 8 9

1 2 3 4 5

6. CONNECTION DIAGRAM (KEX-73)

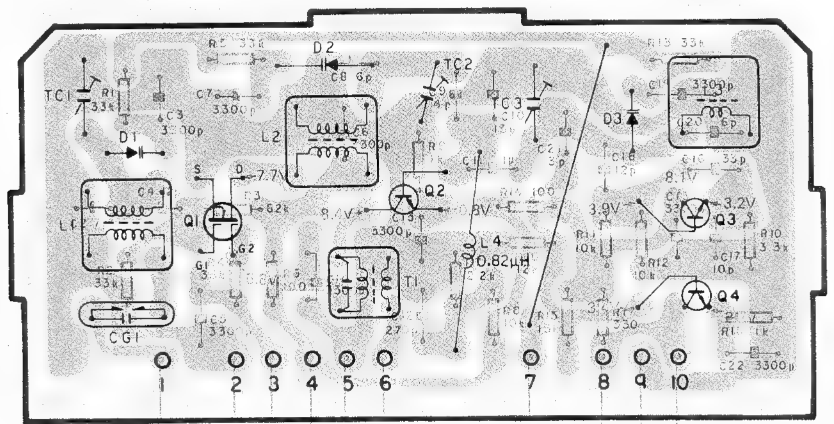
A

FE IF UNIT (CWE-421)



B

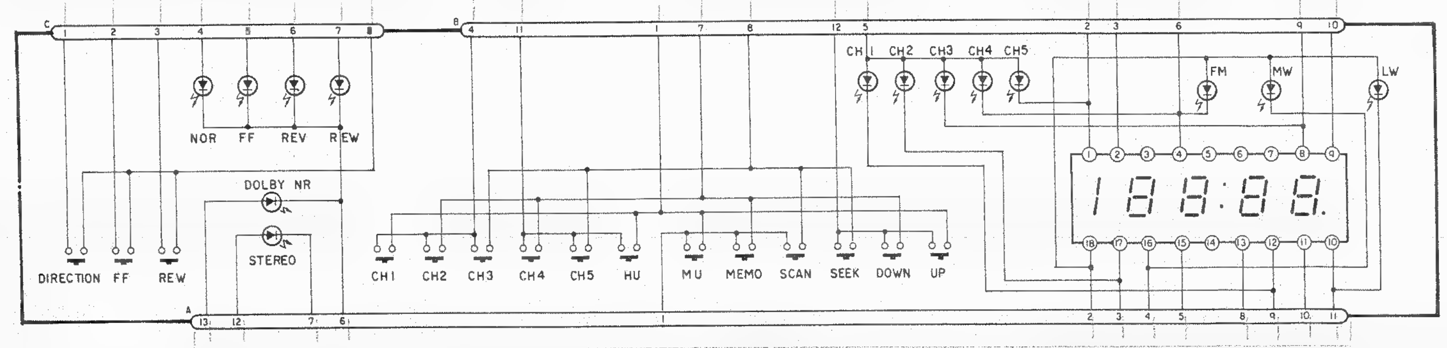
FM FRONT END UNIT (CWB-079)



Q1: P001 or SD306PA
D1 ~ 3: ITT310-PF, PE
Q2, 4: 2SC1674-M
Q3: 2SC1675-M

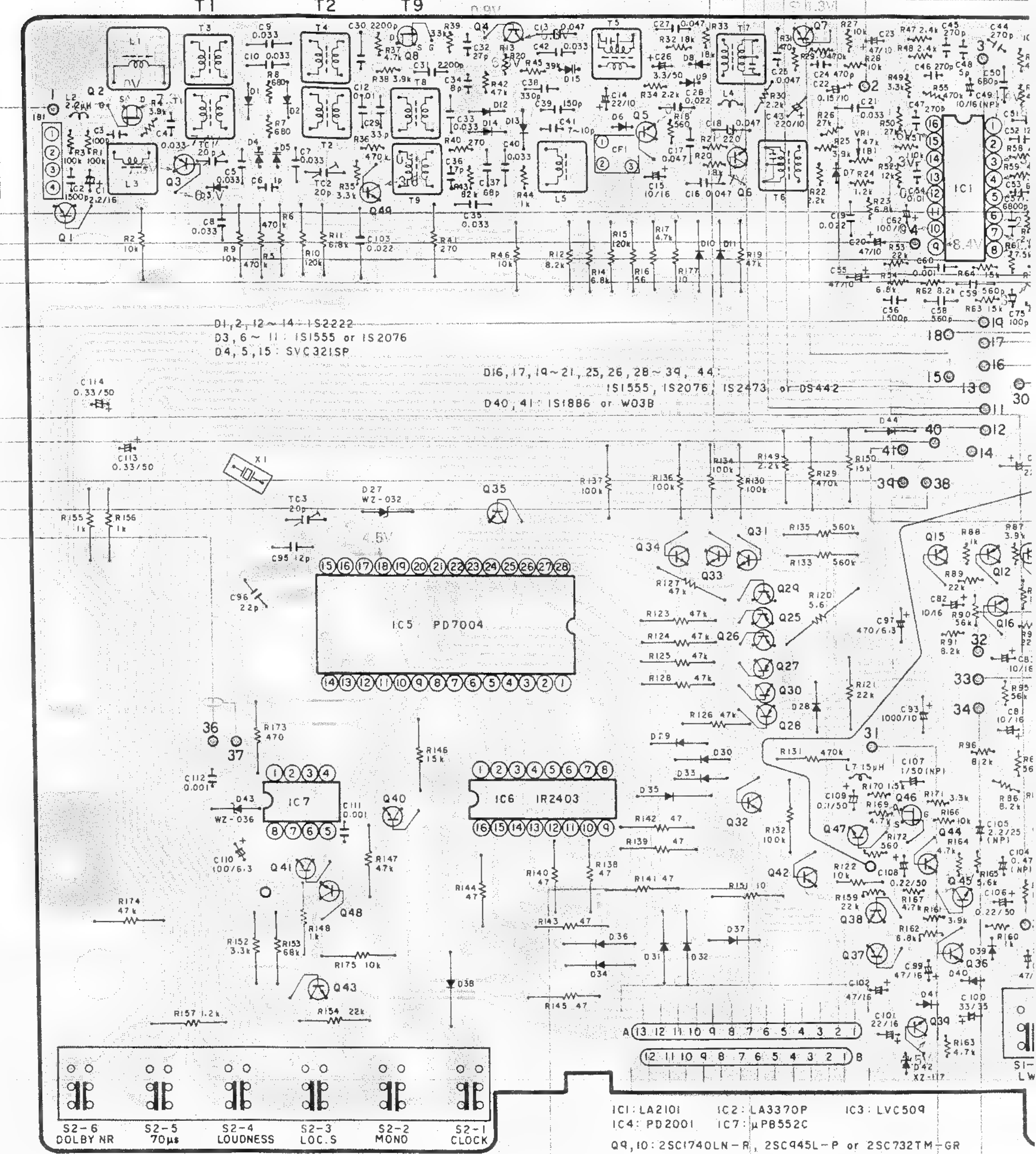
C

SWITCH UNIT
(CWS-103)



D

TUNER CONTROL UNIT (CWM-073)



IC1: LA2101 IC2: LA3370P IC3: LVC509
IC4: PD2001 IC7: μPB552C

1 2 3 4 5

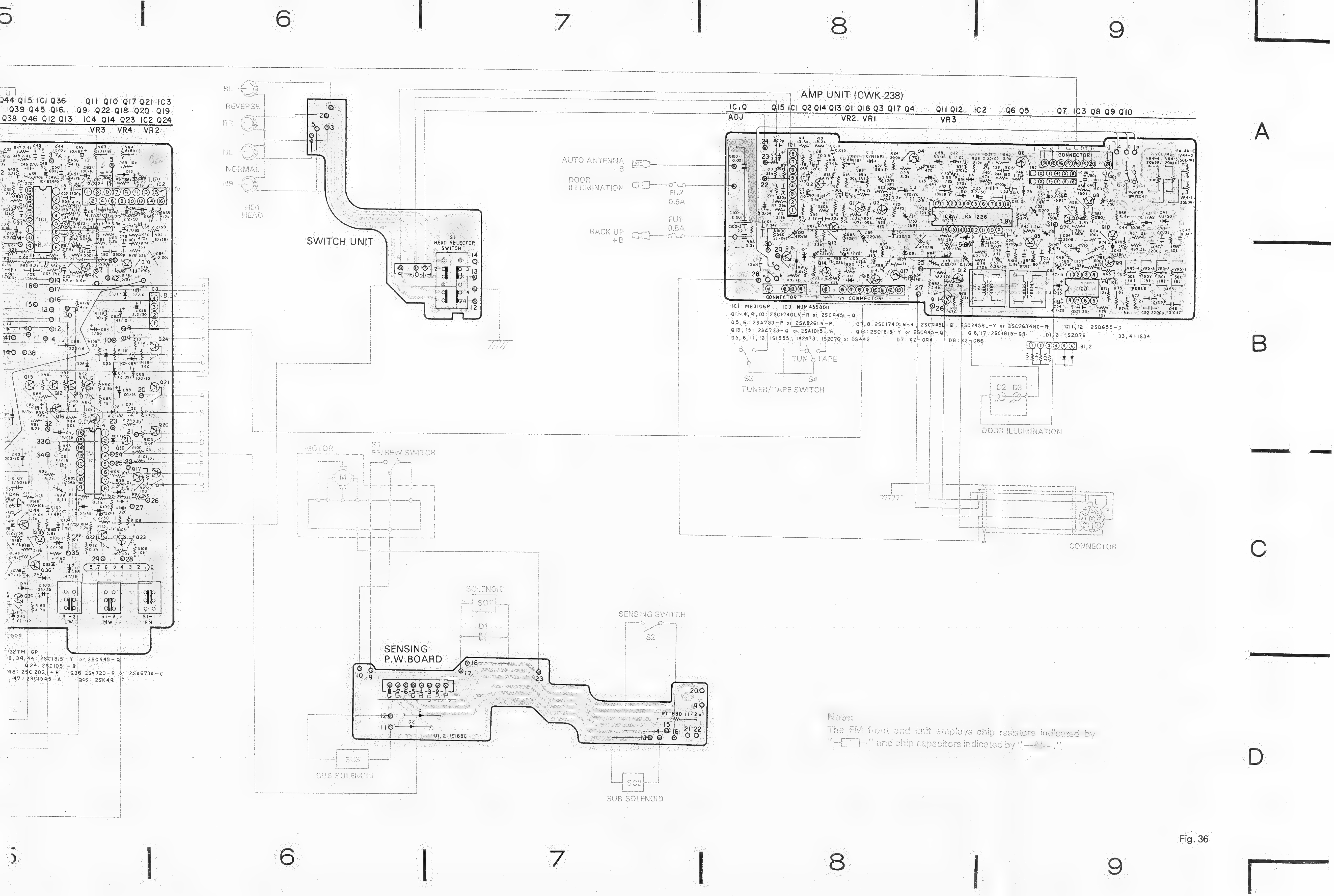
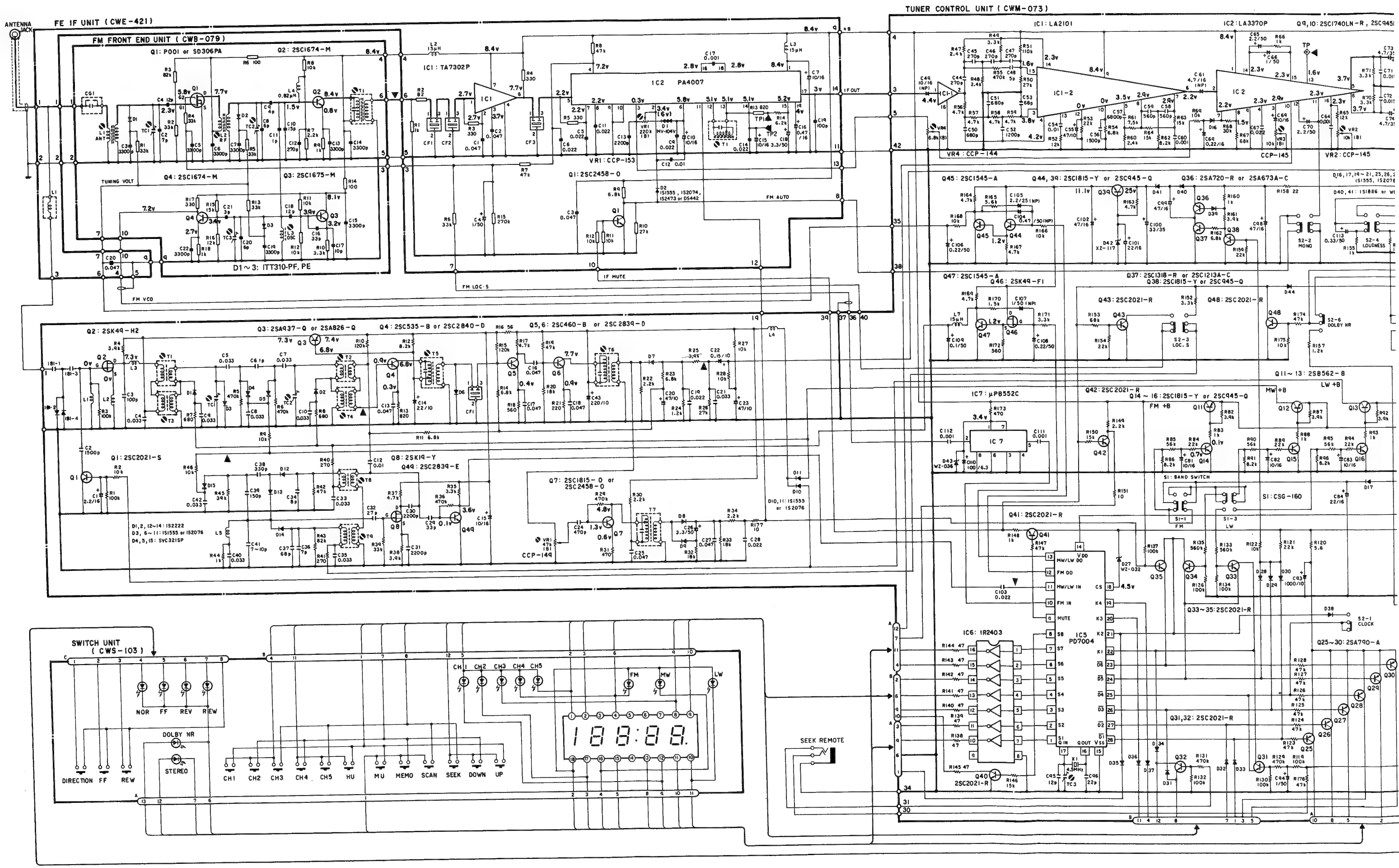

AMP UNIT (CWK-238)
SWITCH UNIT
S1 HEAD SELECTOR SWITCH
HD1 HEAD
REVERSE
NORMAL
AUTO ANTENNA +B
DOOR ILLUMINATION
BACK UP +B
FU2 0.5A
FU1 0.5A
CONNECTOR
TUNER/TAPE SWITCH
S3
S4
TUN
TAPE
DOOR ILLUMINATION
D2 D3
MOTOR
S1 FF/REW SWITCH
SOLENOID
SO1
D1
SENSING SWITCH
S2
SENSING P.W.BOARD
SO3
SUB SOLENOID
SO2
SUB SOLENOID
HA11226
IC1: MB3106M IC3: NJM4558DD
S1-3 LW
S1-2 MW
S1-1 FM
Note:
The FM front end unit employs chip resistors indicated by "—▭—" and chip capacitors indicated by "—▮—."

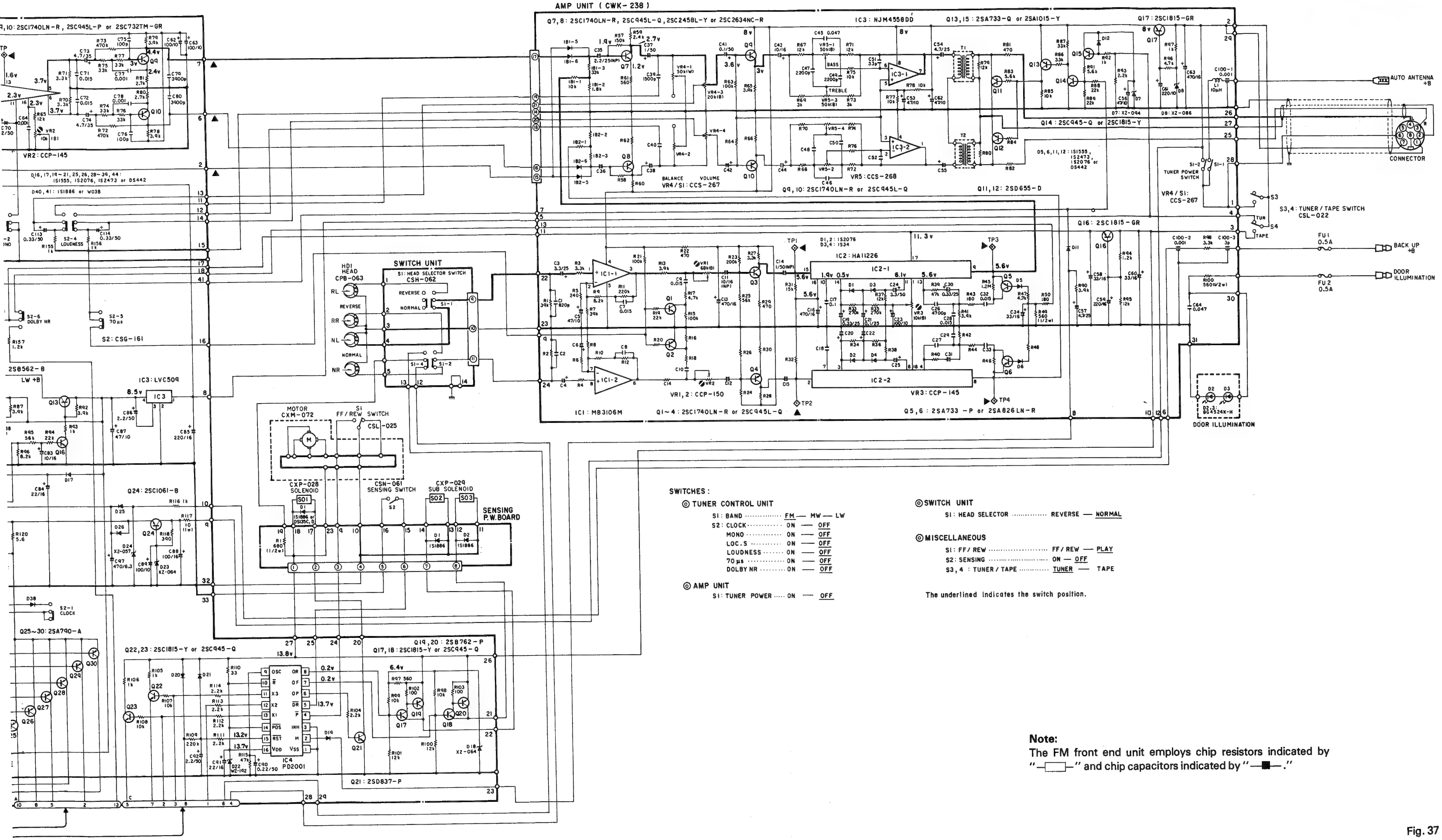
Fig. 36

7. SCHEMATIC CIRCUIT DIAGRAM (KEX-73)



5 | 6 | 7 | 8 | 9

A B C D



SWITCHES :

◎ TUNER CONTROL UNIT

S1 : BAND .... FM — MW — LW
S2 : CLOCK .... ON — OFF
MONO .... ON — OFF
LOC.S .... ON — OFF
LOUDNESS .... ON — OFF
70 μs .... ON — OFF
DOLBY NR .... ON — OFF

◎ AMP UNIT

S1 : TUNER POWER ..... ON — OFF

◎ SWITCH UNIT

S1 : HEAD SELECTOR .... REVERSE — NORMAL

◎ MISCELLANEOUS

S1 : FF / REW .... FF / REW — PLAY
S2 : SENSING .... ON — OFF
S3, 4 : TUNER / TAPE .... TUNER — TAPE

The underlined indicates the switch position.

Note:
The FM front end unit employs chip resistors indicated by "—▭—" and chip capacitors indicated by "—■—."

Fig. 37

5 | 6 | 7 | 8 | 9

8. CABINET EXPLODED VIEW

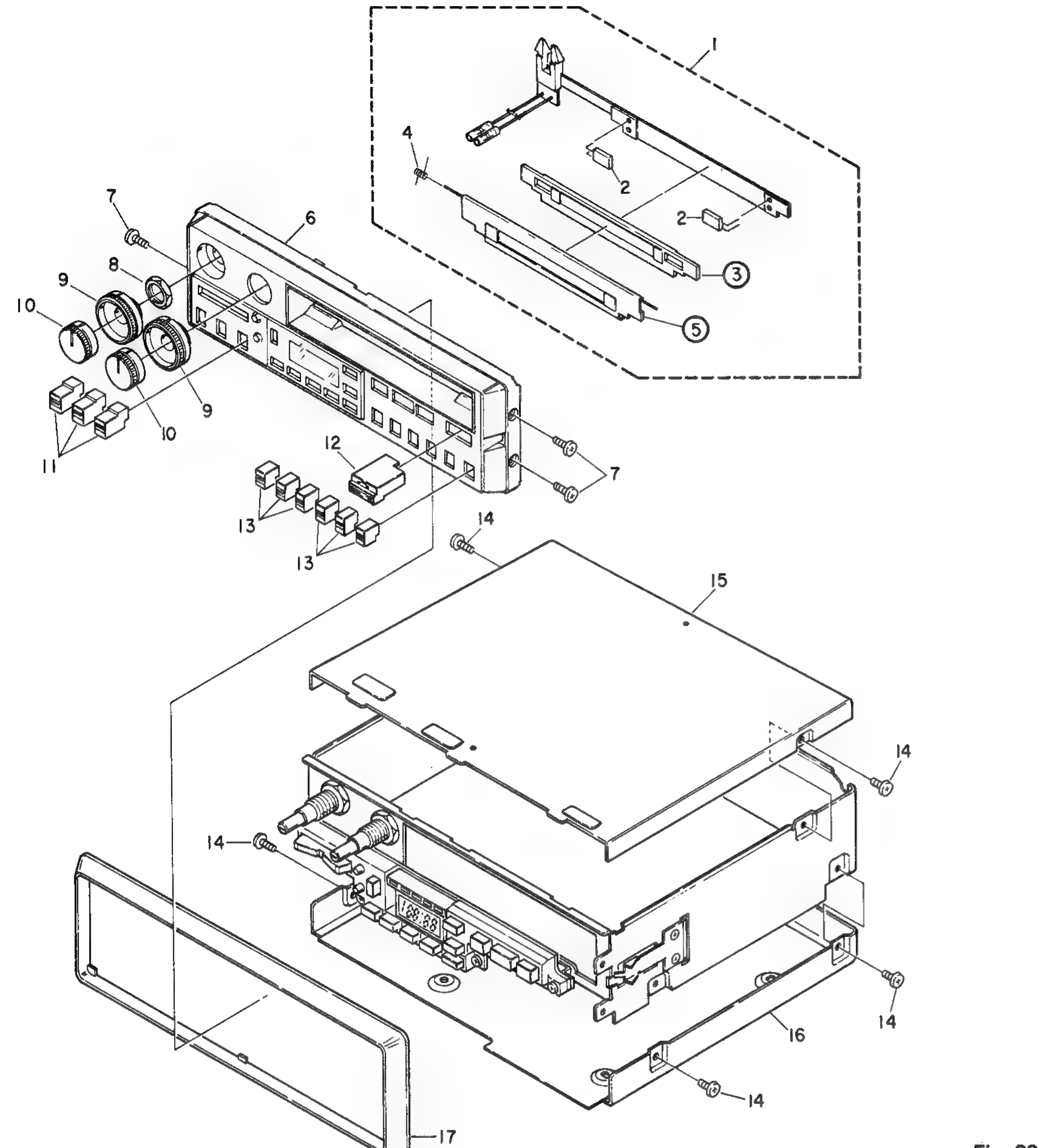
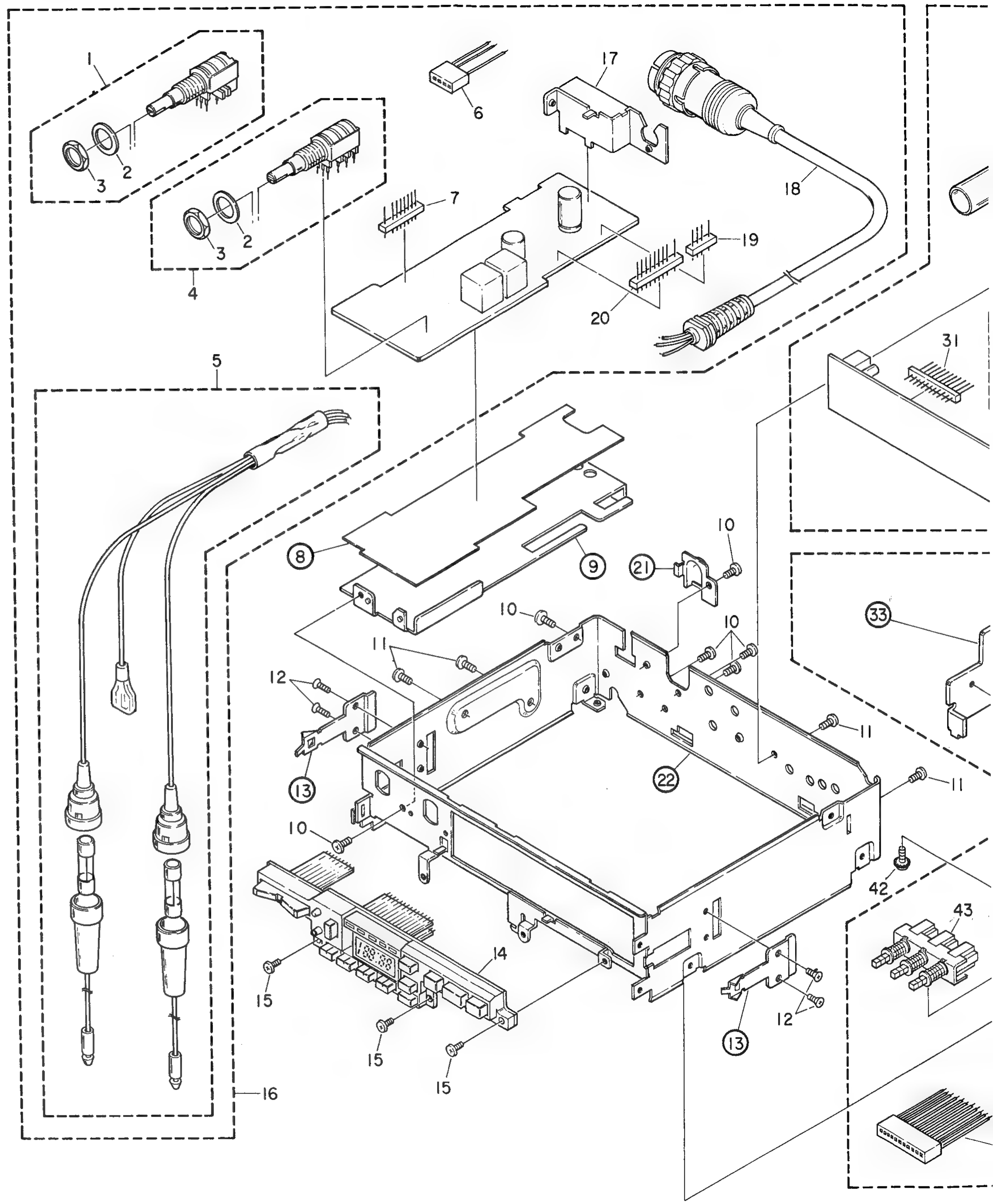


Fig. 38

• **Parts List**

Mark	No.	Part No.	Description
	1.	CXC-322	Door Assy
★	2.	BG4524K-H	LED
	3.		Plate
	4.	CBH-652	Spring
	5.		Door
	6.	CXC-331	Grille Unit (KEX-70)
		CXC-324	Grille Unit (KEX-73)
	7.	PMZ26P040FCR	Screw
	8.	CBA-065	Nut
★	9.	CAA-348	Knob (Balance, Bass)
★	10.	CAA-349	Knob (Volume, Treble)
★	11.	CAC-346	Button (Band)
★	12.	CAC-347	Button (Eject)
★	13.	CAC-345	Button (Clock, Mono, Loc. s, Loud, 70 μs, Dolby NR)
	14.	BMZ30P040FMC	Screw
	15.	CXC-326	Case
	16.	CXC-327	Case
	17.	CNS-692	Panel

9. CHASSIS EXPLODED VIEW



4 5 6

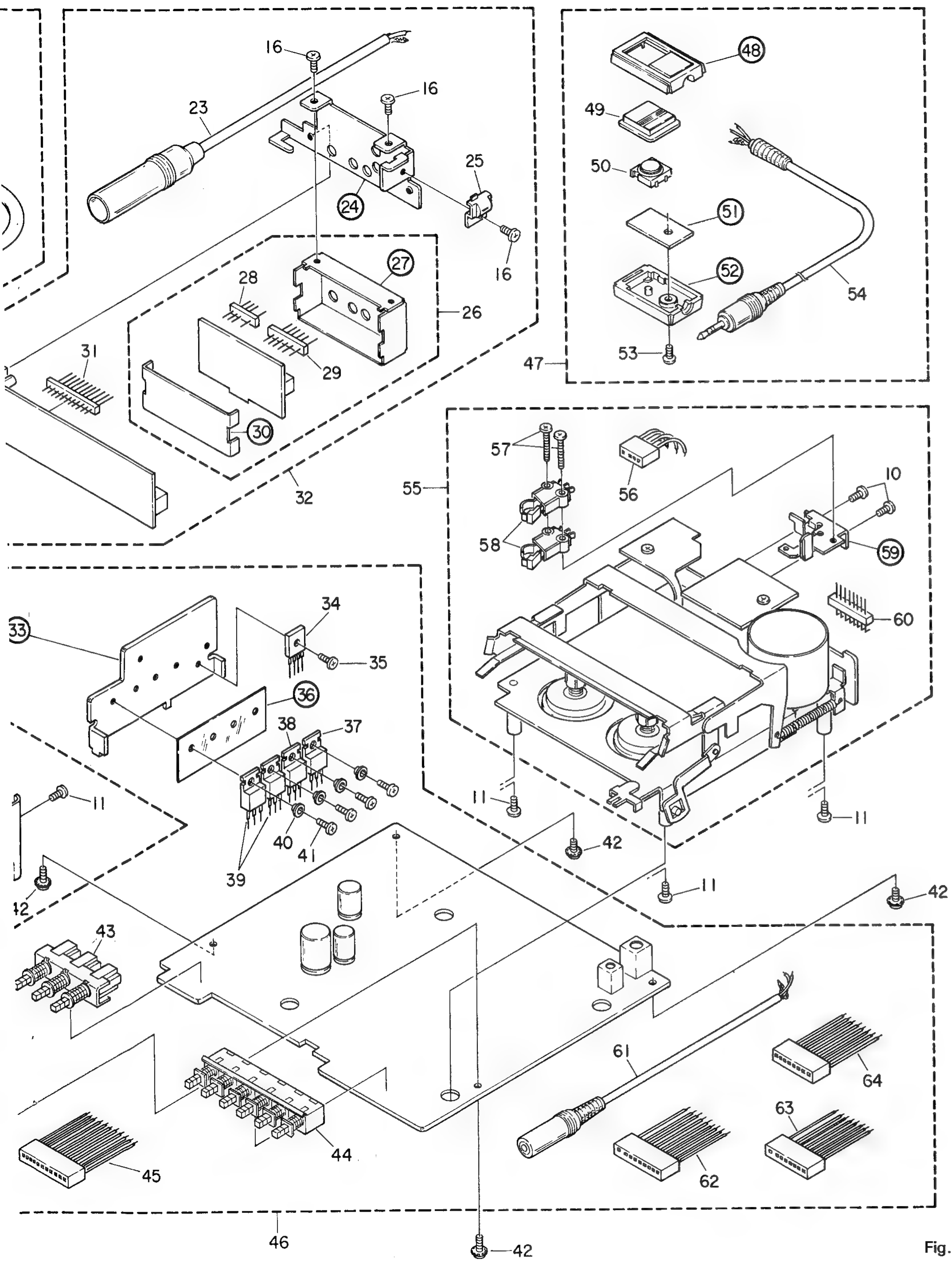


Fig. 39

A B C D

• Parts List

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  ★ ★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts whose parts numbers are omitted are subject to being not supplied.*

Mark	No.	Part No.	Description
★★	1.	CCS-267	Volume/Switch Volume, 20 kΩ (B), 50 kΩ (W) (Volume, Balance/Tuner Power)
	2.	CBE-014	Washer
	3.	CBA-065	Nut
★★	4.	CCS-268	Volume, 50 kΩ (B) × 2 (Bass, Treble)
★	5.	CDE-861	Cord
	6.	CDE-855	Connector
	7.	CKS-063	Plug
	8.		Insulator
	9.		Holder
	10.	BMZ26P040FMC	Screw
	11.	BMZ30P040FMC	Screw
	12.	CBA-103	Screw
	13.		Spring
	14.	CWS-104 CWS-103	Switch Unit (KEX-70) Switch Unit (KEX-73)
	15.	PMZ26P050FMC	Screw
	16.	CWK-238	Amp Unit
	17.	CCL-106	Feed through Capacitor
	18.	CDE-853	Connector
	19.	CKS-032	Plug
	20.	CKS-051	Plug
	21.		Clamper
	22.		Chassis
	23.	CDH-060	Antenna Cable
	24.		Holder
	25.	CNF-101	Clamper
	26.	CWB-079	FM Front End Unit
	27.		Case
	28.	CKS-094	Plug
	29.	CKS-093	Plug
	30.		Shield
	31.	CKS-178	Plug
	32.	CWE-421	FE IF Unit
	33.		Heat Sink
★★	34.	LVC509	IC
	35.	BMZ30P050FMC	Screw
	36.		Insulator
★★	37.	2SC1061	Transistor
★★	38.	2SD837	Transistor
★★	39.	2SB762	Transistor
	40.	B21-679	Insulating Bushing
	41.	BMZ26P060FMC	Screw
	42.	CBA-104	Screw
	43.	~~CSG-180~~ 161	Switch (Band)
★★	44.	~~CSG-181~~ CSG 160	Switch (Clock, Mono, Loc. s, Loud, 70 μs, Dolby NR)
	45.	CDE-857	Connector
	46.	CWM-070 CWM-073	Tuner Control Unit (KEX-70) Tuner Control Unit (KEX-73)
	47.	CEA-481	Remote Switch Assy
	48.		Case
★	49.	CAD-112	Button
★★	50.	CSG-162	Switch
	51.		P.C. Board
	52.		Case
	53.	BRZ26P050BK	Screw
	54.	CDE-859	Cord
	55.	CXC-315	Cassette Mechanism Assy
	56.	CDE-850	Connector
	57.	BMZ26P140FMC	Screw
★★	58.	CSL-022	Switch (Tuner/Tape)
	59.		Lever Unit
	60.	CKS-054	Plug
	61.	CDE-858	Cord
	62.	CDE-852	Connector
	63.	CDE-851	Connector
	64.	CDE-856	Connector

4 5 6

10. PACKING METHOD

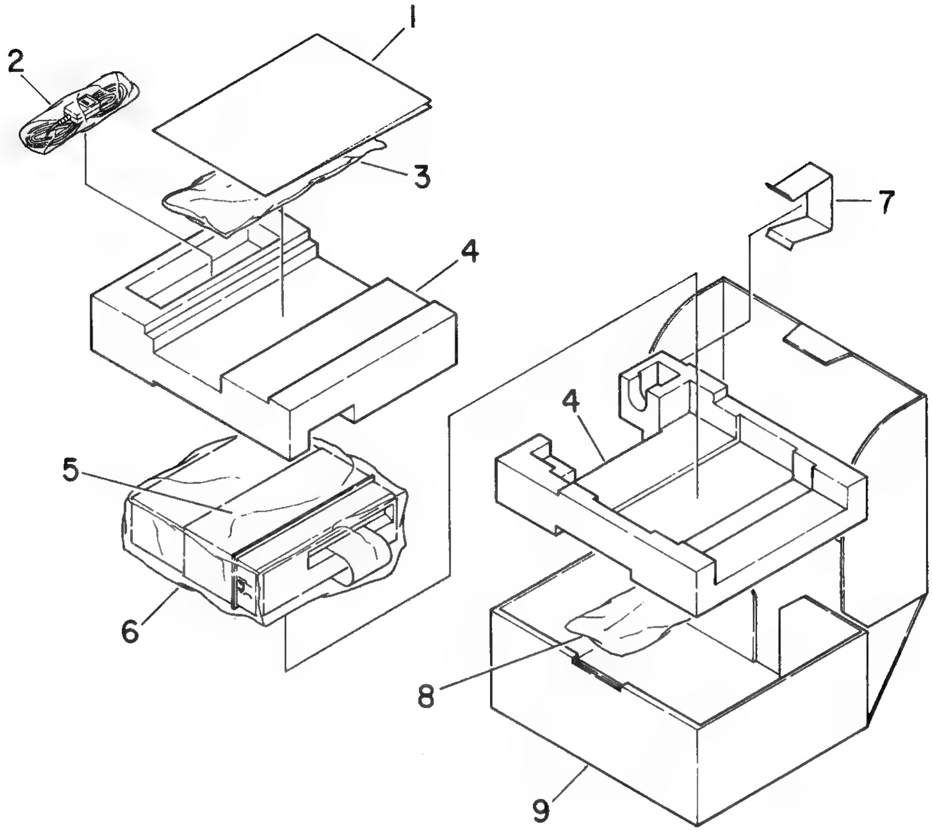


Fig. 40

• **Parts List**

Mark	No.	Part No.	Description
	1.	CRD-175	Owner's Manual (KEX-70)
		CRD-174	Owner's Manual (KEX-73) (Swedish, Norwegian, Dutch, Italian)
		CRD-173	Owner's Manual (KEX-73) (English, French, German, Spanish)
	2.	CEA-481	Remote Switch Assy
	3.	CEA-480	Accessory Kit
	3-1.	CNF-111	Strap
	3-2.	CBA-028	Screw for Strap
	3-3.	NF40FMC	Nut

Mark	No.	Part No.	Description
	3-4.	WS40FMC	Washer
	3-5.	NF50FMC	Nut
	3-6.	PMB50Y160FMC	Screw
	4.	CHC-107	Styrofoam (1 set pair)
	5.	CNF-096	Holder
	6.	CEG-114	Cover
	7.	CNF-097	Holder
	8.	CNS-692	Panel
	9.	CHC-103	Carton (KEX-70)
		CHC-104	Carton (KEX-73)

11. ELECTRICAL PARTS LIST

NOTE:

When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 *When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).*

560Ω	56×10^1	561	RD1/4PS 5 6 1 J
47kΩ	47×10^3	473	RD1/4PS 4 7 3 J
0.5Ω	0R5		RN2H 0 R 5 K
1Ω	010		RS1P 0 1 0 K

Ex. 2 *When there are 3 effective digits (such as in high precision metal film resistors).*

5.62kΩ	562×10^1	RN1/4SR 5 6 2 1 F

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  ★ ★: GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts whose parts numbers are omitted are subject to being not supplied.*

FM Front End Unit (CWB-079)

MISCELLANEOUS

Mark	Part No.	Symbol & Description	
★★	P001 or	Q1	
★★	SD306PA		
★★	2SC1674	Q2, Q4	
★★	2SC1675-M	Q3	
★	ITT310-PE or	D1–D3	
★	ITT310-PF		
	CTC-113	L1	Coil
	CTC-116	L2	Coil
	CTC-114	L3	Coil
	CTF-015	L4	Ferri-Inductor, 0.82 μH
	CTC-117	T1	IF Transformer
	CCL-068	CG1	Capacitor (with discharge gap)
	CCG-038	TC1–TC3	Ceramic Trimmer

CHIP RESISTORS

Mark	Part No.	Symbol & Description
	RS1/8S□□□J	R1–R18

CHIP CAPACITORS

Mark	Part No.	Symbol & Description
	VACANT	C1
	CCSSH070D50	C2
	CKSYB332K50	C3, C5–C7, C13–C15, C19, C22
	CCSSH120J50	C4
	CCSSH060C50	C8
	CCSCH040C50	C9
	CCSSH150J50	C10
	CCSCH010C50	C11
	CCSCH271J50	C12
	CCSSH330J50	C16
	CCSTH100D50	C17
	CCSTH120J50	C18
	CCSTH060C50	C20
	CCSTH030C50	C21

FE IF UNIT (CWE-421)

MISCELLANEOUS

NOTICE:

Match ceramic filters CF1, CF2 and CF3 with those of the same color mark.

Mark	Part No.	Symbol & Description	
★★	TA7302P	IC1	
★★	PA4007	IC2	
★★	2SC2458	Q1	
★	MV-104V	D1	
★	1S1555 or	D2	
★	1S2074 or		
★	1S2473 or		
★	DS442		
	CTB-091	L1	Coil
	CTF-016 or	L2, L3	Ferri-Inductor, 15 μH

Mark	Part No.	Symbol & Description	
	CTF-078		
	CTC-137	T1	Coil
	CTF-101	CF1—CF3	Ceramic Filter
★★	CCP-153	VR1	Semi-fixed, 220 kΩ (B)

RESISTORS

Mark	Part No.	Symbol & Description	
	RS1/8□□□J	R1—R13, R15 (Chip Resistor)	
	CCN-095	R14	6.2 kΩ

CAPACITORS

Mark	Part No.	Symbol & Description	
	CKSYF473Z50	C1—C3, C20 (Chip Capacitor)	
	CEA010M50LL	C4	
	CKSYF223Z50	C5, C6, C9, C11, C14 (Chip Capacitor)	
	CEA100M16LL	C7, C10, C15	
	VACANT	C8	
	CKSYB102K50	C12, C17	(Chip Capacitor)
	CKSYB222K50	C13	(Chip Capacitor)
	CSYAR47K16SAN	C16	
	CEA3R3M50LL	C18	
	CCSSL101K50	C19	(Chip Capacitor)

Tuner Control Unit (CWM-070) (KEX-70)

MISCELLANEOUS

Mark	Part No.	Symbol & Description	
★★	LA1130	IC1	
★★	LA2101	IC2	
★★	LA3370P	IC3	
★★	LVC509	IC4	
★★	PD2001	IC5	
★★	PD7004	IC6	
★★	IR2403	IC7	
★★	μPB552C	IC8	
★★	2SK163	Q1	
★★	2SC1815 or	Q2, Q4—Q8	
★★	2SC2458		
★★	2SA1015 or	Q3	
★★	2SA1048		
★★	2SC1740LN or	Q9, Q10	
★★	2SC945L or		
★★	2SC732TM		
★★	2SB562	Q11, Q12	
★★	2SC1815 or	Q13—Q15, Q19, Q20, Q35,	
★★	2SC945	Q36, Q41	
★★	2SB762	Q16, Q17	
★★	2SD837	Q18	
★★	2SC1061	Q21	
★★	2SA790	Q22—Q27	
★★	2SC2021	Q28—Q32, Q37—Q40, Q45	
★★	2SA720 or	Q33	
★★	2SA673A		
★★	2SC1318 or	Q34	
★★	2SC1213A		
★★	2SC1545	Q42, Q44	
★★	2SK49-F1	Q43	
★	1S1555 or	D1, D2, D7, D8, D12, D13,	
★	1S2473 or	D15—D17, D21, D22, D24—D35,	
★	DS442	D40, D41	
★	SVC321SP-B-53 or	*D3, *D5, *D6	
★	SVC321SP-B-55 or		
★	SVC321SP-B-57 or		
★	SVC321SP-B-59 or		
★	SVC321SP-D-53 or		
★	SVC321SP-D-55 or		
★	SVC321SP-D-57 or		
★	SVC321SP-D-59		
★	RD3.0EB	D4	
★	1S188FM-1	D9—D11	
★	XZ-064	D14, D19	
★	WZ-192	D18	
★	XZ-057	D20	
★	WZ-032	D23	
★	1S1886 or	D36, D37	
★	W03B		
★	XZ-117	D38	
★	WZ-036	D39	
	CTC-057 or	L1	Coil, 18 mH
	CTC-058		
	VACANT	L2, L3	
	T24-030	L4	Ferri-Inductor, 100 μH
	CTF-016 or	L5	Ferri-Inductor, 15 μH
	CTF-078 or		
	CTF-099		
	CTB-102	T1	Coil
	CTB-103	T2	Coil
	CTB-104	T3	Coil
	CTE-113	T4	IF Transformer
	CTE-114	T5	IF Transformer
	CTF-130	CF1	Ceramic Filter
	CTF-131	CF2	Ceramic Filter
	CCG-070	TC1, TC2	Ceramic Trimmer, 20 pF
	CCG-030	TC3	Ceramic Trimmer, 20 pF
	CSS-021 or	X1	Crystal Resonator
	CSS-022		
	CWW-104	IB1	Inline Block
★★	CCP-153	VR1	Semi-fixed, 220 kΩ (B)
★★	CCP-145	VR2, VR3	Semi-fixed, 10 kΩ (B)
★★	CCP-144	VR4	Semi-fixed, 6.8 kΩ (B)
★★	CSG-160	S1	Switch (Band)
★★	CSG-161	S2	Switch (Clock, Mono, Loud, 70 μs, Dolby NR)

RESISTORS

Mark	Part No.	Symbol & Description
	RD1/4VM□□□J	R1—R95, R97, R98, R101, R138—R152
	RS1P□□□K	R96
	RD1/4PS□□□J	R99
	RD1/4PM□□□J	R100, R102—R137, R153—R155

CAPACITORS

Mark	Part No.	Symbol & Description
	CKDBC223K50	C1, C5, C16, C21, C32
	CKDBC152K25	C2
	CEA2R2M50LL	C3, C54, C69, C75
	CKDBC473K25	C4, C7, C8, C14, C18, C31, C104
	CKDBC103K25	C6, C13, C20, C28, C29, C43
	CEA220M6R3LL	C9
	CCDSL470K50L	C10
	CCDSH331J50L	C11
	CCDSH820J50L	C12
	CEA470M10L	C15, C44, C72
	CEA221M10L	C17
	CKDBC222K25	C19
	CKDBC104K25	C22
	CKDYB101K50L	C23, C63, C64
	CEA2R2M25NP	C24, C94
	CEAR47M50NP	C25, C93
	CEA100M16LL	C26, C58
	CEA4R7M35LL	C27, C61, C62
	CEA010M50LL	C30, C55
	CKDSA271J50	C33—C36
	CCDSL050D50L	C37
	CEA100M16NP	C38
	CKDSA681J50	C39, C40
	CQMA122J50	C41
	CKDSA680J50	C42
	CQMA152J50	C45
	CQMA682J50L	C46
	CKDSA561J50	C47, C48
	CKDSA102J50	C49
	CEA4R7M16NP	C50
	CEA101M10L	C51, C52, C78
	CQSAH102J50	C53
	CQMA223J50	C56
	CSYAR22M16SAN	C57
	CQMA153J50	C59, C60
	CQMA102J50	C65, C66
	CQMA392J50	C67, C68
	CSYAR15K10SAN	C70
	CCDWK120J50L	C71
	CEA220M16L	C73, C80
	CEA221M16L	C74
	CEA470M10LL	C76
	CEA101M16L	C77
	CEAR22M50LL	C79, C95, C97

Mark	Part No.	Symbol & Description
	CEA2R2M50L	C81
	CCH-046	C82 1000 μF/10V
	CEA010M50L	C83
	CCDCH120J50L	C84
	CCDCH220J50L	C85
	CEA471M6R3L	C86
	CEA470M16L	C87, C88, C91
	CEA330M35L	C89
	CEA220M16LL	C90
	CKPYY223N16	C92
	CEA010M50NP	C96
	CEA0R1M50LL	C98
	CEA101M6R3LL	C99
	CKDYB102K50L	C100, C101
	CEAR33M50LL	C102, C103
	CCDWL070D50L or CCDWL060D50L or CCDWL050D50L or CCDWL040D50L	*C105

Caution:
Diodes *D3, D5 and D6 and capacitor *C105 used mutually in the following assembly.

D3, D5, D6	C105
SVC321SP-B-53	CCDWL070D50L
SVC321SP-B-55	CCDWL060D50L
SVC321SP-B-57	CCDWL050D50L
SVC321SP-B-59	CCDWL040D50L
SVC321SP-D-53	CCDWL070D50L
SVC321SP-D-55	CCDWL060D50L
SVC321SP-D-57	CCDWL050D50L
SVC321SP-D-59	CCDWL040D50L

Tuner Control Unit (CWM-073) (KEX-73)

MISCELLANEOUS

Mark	Part No.	Symbol & Description	
★★	LA2101	IC1	
★★	LA3370P	IC2	
★★	LVC509	IC3	
★★	PD2001	IC4	
★★	PD7004	IC5	
★★	IR2403	IC6	
★★	μPB552C	IC7	
★★	2SC2021	Q1	
★★	2SK49-H2	Q2	
★★	2SA937 or	Q3	
★★	2SA826		
★★	2SC535-Bor	Q4	
★★	2SC2840-D		
★★	2SC460-Bor	Q5, Q6	
★★	2SC2839-D		
★★	2SC1815 or	Q7	
★★	2SC2458		
★★	2SK19-Y	Q8	
★★	2SC1740LN or	Q9, Q10	
★★	2SC945L or		
★★	2SC732TM		
★★	2SB562	Q11–Q13	
★★	2SC1815 or	Q14–Q18, Q22, Q23, Q38,	
★★	2SC945	Q39, Q44	
★★	2SB762	Q19, Q20	
★★	2SD837	Q21	
★★	2SC1061	Q24	
★★	2SA790	Q25–Q30	
★★	2SC2021	Q31–Q35, Q40–Q43, Q48	
★★	2SA720 or	Q36	
★★	2SA673A		
★★	2SC1318 or	Q37	
★★	2SC1213A		
★★	2SC1545	Q45, Q47	
★★	2SK49-F1	Q46	
★★	2SC2839	Q49	
★	1S2222	D1, D2, D12–D14	
★	1S1555 or	D3, D6–D11	
★	1S2076		
★	SVC321SP-B-53 or	*D4, *D5, *D15	
★	SVC321SP-B-55 or		
★	SVC321SP-B-57 or		
★	SVC321SP-B-59 or		
★	SVC321SP-D-53 or		
★	SVC321SP-D-55 or		
★	SVC321SP-D-57 or		
★	SVC321SP-D-59		
★	1S1555 or	D16, D17, D19–D21, D25,	
★	1S2076 or	D26, D28–D39, D44	
★	1S2473 or		
★	DS442		
★	XZ-064	D18, D23	
★	WZ-192	D22	
★	XZ-057	D24	
★	WZ-032	D27	
★	1S1886 or	D40, D41	
★	W03B		
★	XZ-117	D42	
★	WZ-036	D43	
	CTB-069	L1	Coil, 56 mH
	CTB-081	L2	Coil, 2.2 μH
	CTF-108	L3	Coil, 220 μH
	T24-030	L4	Ferri-Inductor, 100 μH
	CTB-071	L5	Coil, 1 mH
	VACANT	L6	
	CTF-016 or	L7	Ferri-Inductor, 15 μH
	CTF-078 or		
	CTF-099		
	CTB-110	T1	Coil
	CTB-111	T2	Coil
	CTB-074	T3, T4	Coil
	CTE-109	T5	IF Transformer
	CTE-110	T6	IF Transformer
	CTE-111	T7	IF Transformer
	CTB-080	T8	Coil
	CTB-105	T9	Coil
	CTF-126	CF1	Ceramic Filter
	CCG-070	TC1, TC2	Ceramic Trimmer, 20 pF
	CCG-030	TC3	Ceramic Trimmer, 20 pF
	CSS-021 or	X1	Crystal Resonator
	CSS-022		
	CWW-104	IB1	Inline Block
★★	CCP-149	VR1	Semi-fixed, 47 kΩ (B)
★★	CCP-145	VR2, VR3	Semi-fixed, 10 kΩ (B)
★★	CCP-144	VR4	Semi-fixed, 6.8 kΩ (B)
★★	CSG-160	S1	Switch (Band)
★★	CSG-161	S2	Switch (Clock, Mono, Loud, 70 μs, Dolby NR)

RESISTORS

Mark	Part No.	Symbol & Description
	RD1/4VM☐☐☐J	R1, R3, R4, R7, R8, R13, R18, R20–R40, R42–R45, R47–R116, R118, R119, R122, R158–R172, R176
	RD1/4PM☐☐☐J	R2, R5, R6, R9–R12, R14–R17, R19, R41, R46, R121, R123–R157, R173–R175, R177
	RS1P☐☐☐K	R117
	RD1/4PS☐☐☐J	R120

CAPACITORS

Mark	Part No.	Symbol & Description
	CSZA2R2K16	C1
	CKDBC152K25	C2
	CKDYB101K50L	C3, C75, C76
	CQMA333K50L	C4
	CKDBC333K25	C5, C7—C10, C21, C33, C35, C40, C42
	CCDSL010C50	C6
	VACANT	C11
	CKDYD103M50L	C12
	CKDBC473K25	C13, C16—C18, C25, C27
	CEA220M10L	C14
	CEA100M16LL	C15, C69
	CKDBC223K25	C19, C28
	CEA470M10L	C20, C23, C55
	CSYAR15K10SAN	C22
	CKDYB471K50L	C24
	CEA3R3M50LL	C26
	CCPVSL330J50	C29
	CKDYB222K50L	C30, C31
	CCDXK270J50	C32
	CCDPH080D50L	C34
	CCDPH070D50L	C36
	CCDPH680J50L	C37
	CCDPH331J50L	C38
	CCDPH151J50L	C39
	CCDPH100D50L or	*C41
	CCDPH090D50L or	
	CCDPH080D50L or	
	CCDPH070D50L	
	CEA221M10L	C43
	CKDSA271J50	C44—C47
	CCDSL050D50L	C48
	CEA100M16NP	C49
	CKDSA681J50	C50, C51
	CQMA122J50	C52
	CKDSA680J50	C53
	CKDBC103K25	C54
	CQMA152J50	C56
	CQMA682J50L	C57
	CKDSA561J50	C58, C59
	CKDSA102J50	C60
	CEA4R7M16NP	C61
	CEA101M10L	C62, C63, C89
	CQSAH102J50	C64
	CEA2R2M50LL	C65, C70, C86
	CEA010M50LL	C66
	CQMA223J50	C67
	CSYAR22M16SAN	C68
	CAMA153J50	C71, C72
	CEA4R7M35LL	C73, C74
	CQMA102J50	C77, C78

Mark	Part No.	Symbol & Description
	CQMA392J50	C79, C80
	CEA100M16L	C81—C83
	CEA220M16L	C84, C91
	CEA221M16L	C85
	CEA470M10LL	C87
	CEA101M16LL	C88
	CEAR22M50LL	C90, C106, C108
	CEA2R2M50L	C92
	CCH-046	C93 1000 μF/10V
	CEA010M50L	C94
	CCDCH120J50L	C95
	CCDCH220J50L	C96
	CEA471M6R3L	C97
	CEA470M16L	C98, C99, C102
	CEA330M35L	C100
	CEA220M16LL	C101
	CKPYY223N16	C103
	CEAR47M50NP	C104
	CEA2R2M25NP	C105
	CEA010M50NP	C107
	CEA0R1M50LL	C109
	CEA101M6R3LL	C110
	CKDYB102K50L	C111, C112
	CEAR33M50LL	C113, C114

Caution:
Diodes *D4, D5 and D15 and capacitor *C41 used mutually in the following assembly.

D4, D5, D15	C41
SVC321SP-B-53	CCDPH100D50L
SVC321SP-B-55	CCDPH090D50L
SVC321SP-B-57	CCDPH080D50L
SVC321SP-B-59	CCDPH070D50L
SVC321SP-D-53	CCDPH100D50L
SVC321SP-D-55	CCDPH090D50L
SVC321SP-D-57	CCDPH080D50L
SVC321SP-D-59	CCDPH070D50L

Amp Unit (CWK-238)

MISCELLANEOUS

Mark	Part No.	Symbol & Description
★★	MB3106M	IC1
★★	HA11226	IC2
★★	NJM4558DD	IC3
★★	2SC1740N or	Q1—Q4, Q9, Q10
★★	2SC945L	
★★	2SA733 or	Q5, Q6
★★	2SA826LN	
★★	2SC1740LN-R or	Q7, Q8
★★	2SC945L or	
★★	2SC2458L or	

Mark	Part No.	Symbol & Description	
★★	2SC2634NC-R		
★★	2SD655	Q11, Q12	
★★	2SA733 or	Q13, Q15	
★★	2SA1015		
★★	2SC1815 or	Q14	
★★	2SC945		
★★	2SC1815	Q16, Q17	
★	1S2076	D1, D2	
★	1S34	D3, D4	
★	1S1555 or	D5, D6, D11, D12	
★	1S2473 or		
★	1S2076 or		
★	DS442		
★	XZ-094	D7	
★	XZ-086	D8	
	CTH-035	L1	Coil, 10 μH
	CTH-066	T1, T2	Transformer
★★	CCP-150	VR1, VR2	Semi-fixed, 68 kΩ (B)
★★	CCP-145	VR3	Semi-fixed, 10 kΩ (B)
★★	CCS-267	VR4/S1	Volume/Switch
			Volume, 20 kΩ (B), 50 kΩ (W) (Volume, Balance/Tuner Power)
★★	CCS-268	VR5	Volume, 50 kΩ (B) × 2 (Bass, Treble)
	CWW-097	IB1, IB2	Inline Block

RESISTORS

Mark	Part No.	Symbol & Description
	RD1/4VM☐☐☐J	R1–R29, R33–R44, R47, R48, R50, R57–R97
	RD1/4PM☐☐☐J	R30–R32, R45, R46, R98
	RS1/2P☐☐☐J	R49, R100
	VACANT	R51–R56, R99

CAPACITORS

Mark	Part No.	Symbol & Description	
	CKDYB821K50L	C1, C2	
	CEANL3R3M25L	C3, C4	
	CEA470M10L	C5, C6, C53, C56, C62	
	CQMA153J50L	C7–C10, C28, C29, C32, C33	
	CEA100M6NP	C11, C12	
	CEA471M16L	C13, C16, C63	
	CEA010M50NP	C14, C15	
	CQFA104J50	C17, C18	
	CSYAR33M25SAN	C19, C20, C30, C31	
	CSYA0R1M25SAN	C21, C22	
	CEA101M10L	C23	
	CEA3R3M50LL	C24, C25	
	CQMA472J50L	C26, C27	
	CEA330M16L	C34, C58, C60	
	CEA2R2M25NP	C35, C36	
	CEA010M50L	C37, C38	
	CQMA152J50L	C39, C40	
	CEA0R1M50LL	C41, C42	
	CEA100M16L	C43, C44	
	CQMA473J50L	C45, C46, C64	
	CQMA222J50L	C47–C50	
	CCDSL330K50L	C51, C52	
	CEA4R7M25L	C54, C55, C57	
	CEA221M16L	C59	
	CEA221M10L	C61	
	CCL-106	C100	Feed through Capacitor

Sensing P.W. Board

Mark	Part No.	Symbol & Description
★	1S1886	D1, D2
	RD1/2PS☐☐☐J	R1

Switch Unit

Mark	Part No.	Symbol & Description	
★★	CSH-062	S1	Switch (Head selector)

Miscellaneous Parts List

Mark	Part No.	Symbol & Description	
	CWS-104	Switch Unit (KEX-70)	
	CWS-103	Switch Unit (KEX-73)	
★	DS135C or	D1	
★	DS135D or		
★	1S1886		
★	BG4524K-H	D2, D3	LED
★★	CXM-072	M	Motor
★★	CPB-063	HD1	Head
★★	CXP-028	SO1	Solenoid
★	CXP-029	SO2, SO3	Solenoid
★★	CSL-025	S1	Switch (FF/REW)
★★	CSN-061	S2	Switch (Sensing)
★★	CSL-022	S3, S4	Switch (Tuner/Tape)